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40 CFR Part 420

Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards for the Iron and Steel Manufacturing Point Source Category; Proposed Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 420

[FRL–6897–8]

RIN 2040–AC90

Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards for the Iron and Steel Manufacturing Point Source Category

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: This action presents the Agency's proposed effluent limitations guidelines and standards for wastewater discharges from iron and steel facilities. The proposed regulation revises technology-based effluent limitations guidelines and standards for wastewater discharges associated with the operation of new and existing iron and steel facilities. This action covers sites that generate wastewater while performing the following industrial activities: Metallurgical cokemaking, ironmaking, integrated steelmaking, non-integrated steelmaking, hot forming, steel finishing including electroplating, and other operations including direct iron reduction, briquetting, and forging.

EPA estimates that compliance with this regulation as proposed would reduce the discharge of priority and non-conventional pollutants by at least 210 million pounds per year and would cost an estimated $56.5 million to $61.4 million (1999 $, pre-tax) on an annual basis, with the range reflecting two options proposed for comment. In addition, EPA expects that discharges of conventional pollutants would be reduced, by at least 31.3 million pounds per year. EPA has estimated that the annual quantifiable benefits of the proposal would range from $1.1 million to $2.7 million.

DATES: EPA must receive comments on the proposal by midnight of February 26, 2001. EPA will conduct a public hearing on February 20, 2001 at 9:00 a.m. For information on the location of the public hearing, see **SUPPLEMENTARY INFORMATION.**

ADDRESSES: The public hearing will be held at the EPA auditorium in Waterside Mall, 401 M Street SW, Washington, DC.

Submit written comments to Mr. George M. Jett, Office of Water, Engineering and Analysis Division (4303), U.S. EPA, 1200 Pennsylvania Avenue, NW, Washington, DC 20460. For hand-deliveries or federal express, please send comments to Room 607a West Tower, 401 M Street SW, Washington 20460. For additional information on how to submit comments, see ''Supplementary Information, How to Submit to submit comments''.

The public record for this proposed rulemaking has been established under docket number W–00–25 and is located in the Water Docket East Tower Basement, Room EB57, 401 M St. SW, Washington, DC 20460. The record is available for inspection from 9:00 a.m. to 4:00 p.m., Monday through Friday, excluding legal holidays. For access to the docket materials, call (202) 260–3027 to schedule an appointment. You may have to pay a reasonable fee for copying.

FOR FURTHER INFORMATION CONTACT: For technical information concerning today's proposed rule, contact Mr. George M. Jett at (202) 260–7151 or Mr. Kevin Tingley at (202) 260–9843. For economic information contact Mr. William Anderson at (202) 260–5131.

SUPPLEMENTARY INFORMATION:

Regulated Entities

Entities potentially regulated by this action include:

Category	Examples of regulated entities	Primary SIC and NAICS codes
Industry	• Facilities engaged in metallurgical cokemaking, ironmaking, integrated steelmaking, non-integrated steelmaking, hot forming, steel finishing including electroplating, and other operations including direct iron reduction, briquetting, and forging.	SIC • 3312 • 3316 NAICS • 3311 • 3312

The preceding table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. This table lists the types of entities that EPA is now aware could potentially be regulated by promulgation of this proposed rule. Other types of entities not listed in the table could also be regulated. To determine whether your facility would be regulated by promulgation of this proposed rule, you should carefully examine the applicability criteria in § 420.1 of today's proposed rule and in the applicability subsection of each proposed subpart. You should also examine the description of the proposed scope of each subpart elsewhere in this document. If you still have questions regarding the applicability of this proposed action to a particular entity, consult one of the persons listed for technical information in the preceding **FOR FURTHER INFORMATION CONTACT** section.

How To Submit Comments

EPA requests an original and three copies of your comments and enclosures (including references). Commenters who want EPA to acknowledge receipt of their comments should enclose a self-addressed, stamped envelope. No facsimiles (faxes) will be accepted. Please submit any references cited in your comments.

Comments may also be sent via e-mail to jett.george@epa.gov. Electronic comments must specify docket number W–00–55 and must be submitted as an ASCII, Word, or WordPerfect file avoiding the use of special characters and any form of encryption. Electronic comments on this notice may be filed online at many Federal Depository Libraries. No confidential business information (CBI) should be sent via e-mail.

Protection of Confidential Business Information (CBI)

EPA notes that certain information and data in the record supporting the proposed rule have been claimed as CBI and, therefore, are not included in the record that is available to the public in the Water Docket. Further, the Agency has withheld from disclosure some data not claimed as CBI because release of this information could indirectly reveal information claimed to be confidential. To support the proposed rulemaking, EPA is presenting in the public record certain information in aggregated form or, alternatively, is masking facility identities or employing other strategies in order to preserve confidentiality claims. This approach assures that the information in the public record both explains the basis for today's proposal and allows for a meaningful opportunity for public comment, without compromising CBI claims.

Some tabulations and analyses of facility-specific data claimed as CBI are available to the company that submitted the information. To ensure that all data or information claimed as CBI is protected in accordance with EPA regulations, any requests for release of such company-specific data should be submitted to EPA on company letterhead and signed by a responsible official authorized to receive such data. The request must list the specific data requested and include the following statement, ''I certify that EPA is authorized to transfer confidential business information submitted by my company, and that I am authorized to receive it.''

Overview

The preamble describes the background documents that support this proposed regulation; the legal authority for the proposal; a summary of the proposal; background information; the technical and economic methodologies used by the Agency to develop these proposed regulations and, in an appendix, the definitions, acronyms, and abbreviations used in this notice. This preamble also solicits comment and data on specific areas of interest.

Table of Contents

I. Legal Authority

These regulations are proposed under the authority of sections 301, 304, 306, 307, 308, 402, and 501 of the Clean Water Act, 33 U.S.C.1311, 1314, 1316, 1317, 1318, 1342, and 1361.

II. Legislative Background

A. Clean Water Act

Congress adopted the Clean Water Act (CWA) to ''restore and maintain the chemical, physical, and biological integrity of the Nation's waters.'' Section 101(a), 33 U.S.C. 1251(a). To achieve this goal, the CWA prohibits the discharge of pollutants into navigable waters except in compliance with the statute. The Clean Water Act confronts the problem of water pollution on a number of different fronts. Its primary reliance, however, is on establishing restrictions on the types and amounts of pollutants discharged from various industrial, commercial, and public sources of wastewater.

Congress recognized that regulating only those sources that discharge effluent directly into the nation's waters would not be sufficient to achieve the CWA's goals. Consequently, the CWA requires EPA to promulgate nationally applicable pretreatment standards that restrict pollutant discharges from facilities that discharge wastewater indirectly through sewers flowing to publicly owned treatment works (POTWs). See section 307(b) and (c), 33 U.S.C. 1317(b) & (c). National pretreatment standards are established for those pollutants in wastewater from indirect dischargers that may pass through, interfere with or are otherwise incompatible with POTW operations. Generally, pretreatment standards are designed to ensure that wastewaters from direct and indirect industrial dischargers are subject to similar levels of treatment. In addition, POTWs are required to implement local treatment limits applicable to their industrial indirect dischargers to satisfy any local requirements. See 40 CFR 403.5.

Direct dischargers must comply with effluent limitations in National Pollutant Discharge Elimination System (NPDES) permits; indirect dischargers must comply with pretreatment standards. Effluent limitations in NPDES permits are derived from effluent limitations guidelines and new source performance standards promulgated by EPA. These effluent limitations guidelines and standards are established by regulation for categories of industrial dischargers and are based on the degree of control that can be achieved using various levels of pollution control technology.

1. Best Practicable Control Technology Currently Available (BPT)—Sec. 304(b)(1) of the CWA

EPA may promulgate BPT effluent limits for conventional, priority, and non-conventional pollutants. (Priority pollutants consist of a specified list of toxic pollutants. For more information, see section IV.D.3 below.) In specifying BPT, EPA looks at a number of factors. EPA first considers the cost of achieving effluent reductions in relation to the effluent reduction benefits. The Agency also considers the age of the equipment and facilities, the processes employed, engineering aspects of the control technologies, application of various types of process changes, non-water quality environmental impacts (including energy requirements), and such other factors as the Administrator deems appropriate. See CWA 304(b)(1)(B). Traditionally, EPA establishes BPT effluent limitations based on the average of the best performances of facilities within the industry, grouped to reflect various ages, sizes, processes, or other common characteristics. Where, however, existing performance is uniformly inadequate, EPA may establish limitations based on higher levels of control than currently in place in an industrial category if the Agency determines that the technology is available in another category or subcategory, and can be practically applied.

2. Best Control Technology for Conventional Pollutants (BCT)—Sec. 304(b)(4) of the CWA

The 1977 amendments to the CWA required EPA to identify additional levels of effluent reduction for conventional pollutants associated with BCT technology for discharges from existing industrial point sources. In addition to other factors specified in Section 304(b)(4)(B), the CWA requires that EPA establish BCT limitations after consideration of a two part ''cost-reasonableness'' test. EPA explained its methodology for the development of BCT limitations in July 1986 (51 FR 24974).

Section 304(a)(4) designates the following as conventional pollutants: biochemical oxygen demand (BOD_5), total suspended solids (TSS), fecal coliform, pH, and any additional pollutants defined by the Administrator as conventional. The Administrator designated oil and grease as an additional conventional pollutant on July 30, 1979 (44 FR 44501).

3. Best Available Technology Economically Achievable (BAT)—Sec. 304(b)(2) of the CWA

In general, BAT effluent limitations guidelines represent the best economically achievable performance of plants in the industrial subcategory or category. The CWA establishes BAT as a principal national means of controlling the direct discharge of toxic and nonconventional pollutants. The factors considered in assessing BAT include the cost of achieving BAT effluent reductions, the age of equipment and facilities involved, the process employed, potential process changes, and non-water quality environmental impacts including energy requirements, and such other factors as the Administrator deems appropriate. The Agency retains considerable discretion in assigning the weight to be accorded these factors. An additional statutory factor considered in setting BAT is economic achievability. Generally, EPA determines economic achievability on the basis of total costs to the industry and the effect of compliance with BAT limitations on overall industry and subcategory financial conditions. As with BPT, where existing performance is uniformly inadequate, BAT may reflect a higher level of performance than is currently being achieved based on technology transferred from a different subcategory or category. BAT may be based upon process changes or internal controls, even when these technologies are not common industry practice.

4. New Source Performance Standards (NSPS)—Sec. 306 of the CWA

New Source Performance Standards reflect effluent reductions that are achievable based on the best available demonstrated control technology. New facilities have the opportunity to install the best and most efficient production processes and wastewater treatment technologies. As a result, NSPS should represent the most stringent controls attainable through the application of the best available control technology for all pollutants (that is, conventional, nonconventional, and priority pollutants). In establishing NSPS, EPA is directed to take into consideration the cost of achieving the effluent reduction and any non-water quality environmental impacts and energy requirements.

5. Pretreatment Standards for Existing Sources (PSES)—Sec. 307(b) of the CWA

Pretreatment Standards for Existing Sources are designed to prevent the discharge of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of publicly owned treatment works (POTW). Pretreatment standards are technology-based and are analogous to BAT effluent limitations guidelines.

The General Pretreatment Regulations, which set forth the framework for the implementation of categorical pretreatment standards, are found at 40 CFR part 403. These regulations contain a definition of pass-through that addresses localized rather than national instances of pass-through and establishes pretreatment standards that apply to all non-domestic dischargers. See 52 FR 1586 (Jan. 14, 1987).

6. Pretreatment Standards for New Sources (PSNS)—Sec. 307(c) of the CWA

Section 307(c) of the Act requires EPA to promulgate pretreatment standards for new sources at the same time it promulgates new source performance standards. Such pretreatment standards must prevent the discharge of any pollutant into a POTW that may interfere with, pass through, or may otherwise be incompatible with the POTW. EPA promulgates categorical pretreatment standards for existing sources based principally on BAT technology for existing sources. EPA promulgates pretreatment standards for new sources based on best available demonstrated technology for new sources. New indirect dischargers have the opportunity to incorporate into their plants the best available demonstrated technologies. The Agency considers the same factors in promulgating PSNS as it considers in promulgating NSPS.

B. Section 304(m) Consent Decree

Section 304(m) requires EPA to publish a plan every two years that consists of three elements. First, under section 304(m)(1)(A), EPA is required to establish a schedule for the annual review and revision of existing effluent guidelines in accordance with section 304(b). Section 304(b) applies to effluent limitations guidelines for direct dischargers and requires EPA to revise such regulations as appropriate. Second, under section 304(m)(1)(B), EPA must identify categories of sources discharging toxic or nonconventional pollutants for which EPA has not published BAT effluent limitations guidelines under 304(b)(2) or new source performance standards under section 306. Finally, under 304(m)(1)(C), EPA must establish a schedule for the promulgation of BAT and NSPS for the categories identified under subparagraph (B) not later than three years after being identified in the 304(m) plan. Section 304(m) does not apply to pretreatment standards for indirect dischargers, which EPA promulgates pursuant to sections 307(b) and 307(c) of the Clean Water Act.

On October 30, 1989, Natural Resources Defense Council, Inc., and Public Citizen, Inc., filed an action against EPA in which they alleged, among other things, that EPA had failed to comply with CWA section 304(m). Plaintiffs and EPA agreed to a settlement of that action in a consent decree entered on January 31, 1992. The consent decree, which has been modified several times, established a schedule by which EPA is to propose and take final action for eleven point source categories identified by name in the decree and for eight other point source categories identified only as new or revised rules, numbered 5 through 12. After completing a preliminary study as required by the decree, EPA selected the iron and steel industry as the subject for New or Revised Rule #5. Under the decree, as modified, the Administrator was required to sign a proposed rule for the iron and steel industry no later than October 31, 2000, and must take final action on that proposal no later than April 30, 2002.

III. Scope/Applicability of the Proposed Regulation

EPA solicits comments on various issues specifically identified in the preamble as well as any other applicability issues that are not specifically addressed in today's notice.

A. Facilities Subject to 40 CFR Part 420

EPA is proposing effluent limitations guidelines and standards for seven subcategories of Iron and Steel facilities. Generally speaking, the universe of facilities that would be potentially subject to EPA's proposed guideline include facilities engaged in iron and steel making, whether through the use of blast furnaces and basic oxygen furnaces (BOFs), or through electric arc furnaces (EAFs); metallurgical cokemaking facilities; stand-alone facilities engaged in hot forming and/or finishing of steel, including electroplating; and facilities engaged in other related operations such as direct iron reduction, forging, and iron briquetting.

A detailed discussion of Iron and Steel wastewaters is provided in Section IV.F. In summary, all wastewater discharges to a receiving stream or the introduction of wastewater to a publicly owned treatment works from a facility that falls within the scope of one of the proposed subparts would be subject to the provisions of this proposed rule unless specifically excluded as discussed in the following sections.

The following proposed technology options serve as the basis for the effluent limitations guidelines and standards being proposed today for the iron and steel industry. For descriptions of the subcategories, see Section IV.E. For descriptions of the technologies, see Section V.A.

Subcategory (segment)	Regulatory level	Option chosen	Technical components
Subpart A. Cokemaking:			
(By-Product Recovery)	BAT/NSPS/PSES/PSNS	BAT–3(PSES–3)	tar removal, equalization, ammonia stripping, temperature control, equalization, single-stage biological treatment with nitrification, alkaline chlorination, and sludge dewatering.
	co-proposed PSES	PSES–1	tar removal, equalization, ammonia stripping.
(Non-Recovery)	BAT/NSPS/PSES/PSNS	zero discharge	no wastewater generated.
Subpart B. Ironmaking: (Blast Furnaces) and (Sintering).	BAT/NSPS	BAT–1	solids removal with high-rate recycle and metals precipitation, alkaline chlorination, mixed-media filtration of the blowdown wastewater, and sludge dewatering.
	PSES/PSNS	PSES–1	solids removal with high-rate recycle and metals precipitation, and sludge dewatering.
Subpart C. Integrated Steelmaking	BAT/NSPS/PSES/PSNS	BAT–1	solids removal and high-rate recycle, with metals precipitation for blowdown wastewater, cooling towers for process wastewaters from vacuum degassing or continuous casting operations, and sludge dewatering.
Subpart D. Integrated and Stand Alone Hot Forming:.			
(Carbon & Alloy Steel)	BAT/NSPS	BAT–1	scale pit with oil skimming, roughing clarifier, cooling tower with high rate recycle, mixed-media filtration of blowdown, and sludge dewatering.
	PSES/PSNS	N/A	no proposed modification from existing PSES/PSNS.
(Stainless Steel)	BAT/NSPS	BAT–1	scale pit with oil skimming, roughing clarifier, cooling tower with high rate recycle, mixed-media filtration of blowdown, and sludge dewatering.
	PSES/PSNS	N/A	no proposed modification from existing PSES/PSNS.
Subpart E. Non-Integrated Steelmaking and Hot Forming:			
(Carbon & Alloy Steel)	BAT	BAT–1	solids removal, cooling tower, high rate recycle, mixed-media filtration of recycled flow or of low volume blowdown flow, and sludge dewatering.
	PSES	N/A	no proposed modification from existing PSES.
	NSPS/PSNS	zero discharge	water re-use, evaportion, or contract hauling.
(Stainless Steel)	BAT/PSES	BAT–1	solids removal, cooling tower, high-rate recycle, mixed-media filtration of recycled flow or of low volume blowdown flow, and sludge dewatering.
	NSPS/PSNS	zero discharge	water re-use, evaportion, or contract hauling.
Subpart F. Steel Finishing:			
(Carbon & Alloy Steel)	BAT/NSPS/PSNS	BAT–1	recycle of fume scrubber water, diversion tank, oil removal, hexavalent chrome reduction (where applicable), equalization, metals precipitation, sedimentation, sludge dewatering, and counter-current rinses.
	PSES	N/A	no proposed modification from existing PSES.
(Stainless Steel)	BAT/NSPS/PSNS	BAT–1	recycle of fume scrubber water, diversion tank, oil removal, hexavalent chrome reduction (where applicable), equalization, metals precipitation, sedimentation, sludge dewatering, counter-current rinses, and acid purification.
	PSES		no proposed modification from existing PSES
Subpart G. Other Operations:			
(Direct Reduced Ironmaking)	BPT/BCT/NSPS	BPT–1	solids removal, clarifier, high rate recycle, with filtration of blow-down, and sludge dewatering.
	BAT/PSES/PSNS		reserved.
(Forging)	BPT/BCT/NSPS	BPT–1	high rate recycle, with oil/water separator for blowdown.
	BAT/PSES/PSNS		reserved.

Subcategory (segment)	Regulatory level	Option chosen	Technical components
(Briquetting)	BPT/BCT/BAT/NSPS/PSES/PSNS.	zero discharge	no wastewater generated

B. Interface With Metal Products and Machinery Rule

In preparation for this rulemaking, the Agency determined that certain facilities currently covered by the current Iron and Steel rule have manufacturing processes that more closely resemble those in facilities to be covered by the Metal Products and Machinery (MP&M) rule than those found in what are normally considered to be steel facilities. So that these facilities might be addressed under a regulation that fits them better, EPA proposes to move these types of facilities into the MP&M category, which will be regulated under part 438. The notice proposing effluent limitations guidelines and standards for the MP&M category was also required to be signed by the Administrator by October 31, 2000. EPA is required to take final action on that rule by December 31, 2002 (eight months later than the date for final action on the iron and steel rule). In developing the MP&M rule, EPA will consider survey data and sampling data collected for these types of facilities under Iron and Steel auspices.

For operations that are currently subject to part 420, EPA proposes to retain certain operations in part 420 but move others to part 438, as follows:

Retained in Part 420 (Iron and Steel)	Moved to Part 438 (MP&M)
Cold forming for steel sheet and strip	Cold forming for steel bar, rod, wire, pipe or tube.
Pipe and tube mills with hot forming	Batch steel electroplating.
Finishing with continuous electroplating of flat products (e.g. plate, sheet, strip).	Continuous electroplating or hot dip coating of long steel products (e.g. wire, rod, bar).
Continuous hot dip coating of flat steel products (e.g. plate, sheet, strip).	Batch hot dip coating of steel.
Hot forming	Wire drawing and coating.

For facilities with both iron and steel operations and MP&M or other operations discharging process wastewaters to the same wastewater treatment system, NPDES permit writers would need to use a building block approach to develop the technology-based effluent limitations. Similarly, pretreatment permit writers would need to use a building block approach or the combined wastestream formula to develop appropriate pretreatment requirements for facilities with process operations in more than one category. Permit writers and pretreatment control authorities should refer to the applicability of the proposed MP&M rule for further clarification.

EPA solicits comment on the proposed applicability of the Iron and Steel (Part 420) rule and on the proposed building block approach in regulating facilities with both iron and steel and MP&M or other operations.

C. Centralized Treatment Provision

Under the applicability section of the current regulation, 40 CFR 420.01(b), EPA identified 21 plants that were temporarily excluded from the provisions of Part 420 because of economic considerations, provided that the owner or operator of the facility requested the Agency to consider establishing alternative effluent limitations and provided the Agency with certain information consistent with 40 CFR 420.01(b)(2) on or before July 26, 1982. See 47 FR 23285 (May 27, 1982).

Today, each of the facilities identified in that section has a permit that includes effluent limitations derived from part 420. Today's proposed rule would establish new BAT limitations that EPA believes are economically achievable for each subcategory as a whole. Therefore, EPA believes that the alternate effluent limitations provisions of § 420.01(b) are no longer necessary for these facilities, and proposes to withdraw this exclusion from part 420.

IV. Rulemaking Background

A. Iron and Steel Industry Effluent Guideline Rulemaking History

EPA promulgated BPT, BAT, NSPS, and PSNS for the iron and steel category in June 1974 for basic steelmaking operations (Phase I). See 39 FR 24114 (June 28, 1974), codified at CFR part 420, subparts A–L. EPA promulgated iron and steel effluent limitations guidelines and standards (Phase II) in March 1976 that established BPT, BAT, NSPS, and PSNS for forming and finishing operations. See 41 FR 12990 (March 29, 1976), codified at 40 CFR part 420, subparts M–Z.

In response to petitions for review, the U.S. Court of Appeals for the Third Circuit remanded portions of the Phase I regulation in November 1975. See *American Iron and Steel Institute, et. al.,* v. *EPA,* 526 F.2d 1027 (3d Cir. 1975). The Court rejected all technical challenges to BPT, but ruled that BAT and NSPS for certain subcategories in Phase I were not demonstrated. The Court also ruled that EPA had not adequately considered the impact of plant age on the cost or feasibility of retrofitting pollution control equipment, did not assess the impact of the regulation on water scarcity in arid and semi-arid regions, and failed to make adequate "net/gross" provisions for pollutants found in intake waters.

In response to petitions for review, the U.S. Court of Appeals for the Third Circuit also remanded portions of the Phase II regulation in September 1977. See *American Iron and Steel Institute, et. al.,* v *EPA,* 568 F.2d 284 (3d Cir. 1977). The Court again rejected all technical challenges to BPT; however, it ruled that EPA had not adequately considered age/retrofit and water scarcity issues for BAT. The Court also invalidated the regulation as it applied to the specialty steel industry for lack of proper notice. The Court directed EPA to reevaluate its estimates of compliance costs with regard to certain "site-specific" factors and to reexamine its economic impact analysis for BAT. The Court also ruled that EPA had no authority to exempt certain steel facilities located in the Mahoning Valley of Ohio from the regulation.

The current iron and steel rule, 40 CFR part 420, was promulgated in May 1982, see 47 FR 23258 (May 27, 1982), and was amended in May 1984 as part of a Settlement Agreement among EPA, the iron and steel industry, and the Natural Resources Defense Council. See

49 FR 21024 (May 17, 1984). In promulgating part 420 in 1982, aside from the temporary central treatment exclusion for 21 specified steel facilities at 40 CFR 420.01(b), EPA provided no exclusions for facilities on the basis of age, size, complexity, or geographic location as a result of the remand issues. EPA also revised the subcategorization from that specified in the 1974 and 1976 regulations to more accurately reflect major types of production operations and to attempt to simplify implementation of the regulation by permit writers and the industry. The factors EPA considered in establishing the 1982 subcategories were: Manufacturing processes and equipment; raw materials; final products; wastewater characteristics; wastewater treatment methods; size and age of facilities; geographic location; process water usage and discharge rates; and costs and economic impacts. Of these, EPA found that the type of manufacturing process was the most significant factor and employed this factor as the basis for dividing the industry into the twelve process subcategories currently in part 420.

The 1984 amendment to part 420 affected three portions of the rule: The water bubble (see Section X.E), effluent limitations guideline modifications for BPT, BAT, BCT, and NSPS, and modifications to the pretreatment standards for PSES and PSNS for the Sintering, Ironmaking, Acid Pickling, Cold Forming, and Hot Coating Subcategories.

B. Preliminary Study

EPA was required by the terms of the consent decree described in section II.B to initiate preliminary reviews of a number of categorical effluent limitations guidelines and standards on a set schedule. The ''Preliminary Study of the Iron and Steel Category'' (EPA 821–R–95–037) was completed in 1995.

In the preliminary study, EPA assessed the status of the industry with respect to the regulation promulgated in 1982 and amended in 1984; identified better performing facilities that use conventional and innovative in-process pollution prevention and end-of-pipe technologies; estimated possible effluent reduction benefits if the industry were upgraded to the level of better performing facilities; discussed regulatory and implementation issues associated with the current regulation; and identified possible solutions to those issues.

Comparisons of long-term average effluent quality data for a number of better performing facilities (data represent time periods ranging from six months to more than one year) with the long-term average performance data underlying the current effluent limitations in part 420 revealed that, in all subcategories, some facilities are achieving substantially greater reductions than is required by the current regulation. In a limited number of cases, zero discharge of pollutants is being approached through pollution prevention practices. This performance reflects increased high-rate process water recycle, advances in application of treatment technologies, and advances in treatment system operations. At the same time, however, the study showed that a number of facilities fail to achieve the effluent limitations currently required by part 420.

The study also found that, because most process wastewaters from basic steelmaking operations are generated as a result of air emission control and gas cleaning, there are substantial pollutant transfers from the air media to the water and solid waste media. Also, there appear to be many pollution prevention opportunities in the areas of increased process water recycle and reuse, the cascade of process wastewaters from one operation to another, residuals management, and nondischarge disposal methods.

The Preliminary Study can be found on-line at www.epa.gov/OST/ironsteel.

C. Industry Profile

The Agency estimates that in 1997, the iron and steel industry consisted of 252 facilities owned by at least 109 companies. This estimate is based upon responses to EPA's data gathering efforts, as described in Section IV.D. Many of these companies are joint ventures with both domestic and foreign owners, including partners located in Japan, Great Britain, Germany, and India.

Although there are several iron and steel manufacturing processes (described in Section IV.E.3), the Agency has identified nine general types of sites in the Iron and Steel Category based on the operations present at each site. Table IV.C.1 shows the estimated number of facilities for each of the nine types of sites. Each facility is likely to engage in more than one manufacturing process. For instance, integrated facilities engaged in iron and steel making using blast furnaces and basic oxygen furnaces may also have one or more of the manufacturing operations, such as vacuum degassing or continuous casting, on site. Non-integrated sites engaged in steelmaking with the use of electric arc furnaces may also have vacuum degassing, ladle metallurgy, casting, hot forming, and finishing processes on site. On the other hand, stand-alone finishers that produce cold-rolled and/or coated products from hot rolled steel produced elsewhere tend to have only finishing operations on site. Finally, there are stand-alone pipe and tube facilities producing pipe and/or tube from materials manufactured off site. It is worth noting that only those pipe and tube facilities that produce hot formed pipe and tube are to be included in the Iron and Steel Category. These sites have hot forming operations and may also have finishing processes.

TABLE IV.C.1.—GENERAL TYPES OF IRON AND STEEL SITES IN THE UNITED STATES

Type of site	Total Number of sites operating in 1997
Integrated with Cokemaking	9
Integrated without Cokemaking	11
Stand-alone Cokemaking [1]	15
Stand-alone Sintering [2]	2
Stand-alone Direct-Reduced Ironmaking [3]	1
Non-integrated	94
Stand-alone Hot Forming	39
Stand-alone Finishing	70
Stand-alone Pipe and Tube	11
Total	252

[1] One of the stand-alone cokemaking plants is a nonrecovery cokemaking plant. One additional nonrecovery cokemaking plant started operations after 1997 and is not reflected in this table.

[2] One of these stand-alone sinter plants has been shut down indefinitely since 1997.

[3] One additional stand-alone direct-reduced ironmaking plant started operations after 1997.

As shown Table IV.C.1, non-integrated facilities outnumber integrated facilities by more than four to one, and stand-alone finishing facilities form the second largest group. This reflects a trend that has affected the industry for the past 25 years—a shift of steel production from generally larger, older integrated facilities to newer, smaller non-integrated facilities, and the emergence of specialized, stand-alone finishing facilities that process semi-finished sheet, strip, bars, and rods obtained from integrated or non-integrated facilities.

Integrated steel facilities are primarily located east of the Mississippi River in Illinois, Indiana, Michigan, Ohio, Pennsylvania, West Virginia, Maryland, Kentucky, and Alabama; one integrated steel facility operates in Utah. Coke plants, either stand-alone or co-located at integrated steel facilities, are located in Illinois, Indiana, Michigan, Ohio, New York, Pennsylvania, Virginia, Kentucky, Alabama, and Utah. Non-integrated steel facilities are located throughout the continental U.S., and smaller stand-alone forming and finishing facilities are generally located near steel manufacturing sites. Process wastewater discharges in 1997 ranged from less than 200 gallons per day for a stand-alone finisher to more than 50 million gallons per day for an integrated facility.

D. Summary of EPA Activities and Data Gathering Efforts

1. Industry Surveys

EPA developed an Information Collection Request (ICR) entitled ''U.S. Environmental Protection Agency Collection of 1997 Iron and Steel Industry Data'' that explains the regulatory basis and usefulness of the industry surveys. The ICR was approved by the Office of Management and Budget (OMB) in August 1998. The Agency published three **Federal Register** Notices announcing (1) the intent to distribute the surveys, see 62 FR 54453 (October 20, 1997), (2) the submission of the ICR to the OMB, see 63 FR 16500 (April 3, 1998), and (3) OMB's approval of the survey instrument, see 63 FR 47023 (August 3, 1998). The Agency consulted with the major industry trade associations to develop a useful survey instrument and to ensure an accurate mailing list.

a. *Descriptions.* EPA obtained approval to distribute four industry surveys. The first two surveys were similar in content and purpose; both were designed to collect detailed technical and financial information from iron and steel sites, but they differed in size and were mailed to different facilities. In October 1998, EPA mailed the first survey, entitled ''U.S. EPA Collection of 1997 Iron and Steel Industry Data'' (detailed survey) to 176 iron and steel sites and the second survey, entitled ''U.S. EPA Collection of 1997 Iron and Steel Industry Data (Short Form),'' to 223 iron and steel sites. The short form is an abbreviated version of the detailed survey and was designed for those iron and steel sites known not to produce or process liquid steel (e.g., stand alone hot forming or steel finishing mills). EPA mailed the third and fourth surveys to subsets of facilities to obtain more detailed information on wastewater treatment system costs, analytical data, and facility production. EPA mailed the third survey, entitled ''U.S. EPA Collection of Iron and Steel Industry Wastewater Treatment Capital Cost Data'' (cost survey), to 90 iron and steel sites. EPA mailed the fourth survey, entitled ''U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data'' (analytical daily data and production survey), to 38 iron and steel sites.

The detailed survey and short form were divided into two parts: Part A: Technical Information and Part B: Financial and Economic Information. The technical questions in the detailed survey were divided into four sections, with Sections 3 and 4 being combined in the short form:

• Section 1: General site information
• Section 2: Manufacturing process information
• Section 3: In-process and end-of-pipe wastewater treatment and pollution prevention information
• Section 4: Wastewater outfall information

The financial and economic information in the detailed survey was divided into four sections:

• Section 1: Site identification
• Section 2: Site financial information
• Section 3: Business entity financial information
• Section 4: Corporate parent financial information

The financial and economic information part of the short form contained a single section for site identification and financial information.

The general information questions asked the site to identify itself, characterize itself by certain parameters (including manufacturing operations, age, and location), and confirm that it was engaged in iron and steel activities. The Agency used this information to develop the subcategorization of the industry proposed today.

The manufacturing process section included questions about products, types of steel produced, production levels, unit operations, chemicals and coatings used, wastewater discharge from unit operations, miscellaneous wastewater sources, pollution prevention activities, and air pollution control. The Agency used data received in response to these questions to evaluate manufacturing processes, wastewater generation, and to develop regulatory options. EPA also used these data to develop the subcategorization proposed today and to estimate compliance costs and pollutant removals associated with proposed regulatory options.

EPA requested detailed information (including diagrams) on the wastewater treatment systems and discharge flow rates; monitoring analytical data; and operating and maintenance cost data (including treatment chemical usage). The Agency used data received in response to these questions to identify treatment technologies in place, to determine the feasibility of regulatory options, and to estimate compliance costs, pollutant removals, and potential environmental impacts associated with the regulatory options EPA considered for this proposal.

The outfall information questions covered permit information, discharge location, wastewater sources to the outfall, flow rates, regulated parameters and limits, and permit monitoring data. The Agency used this information to calculate the effluent limitations guidelines and standards and pollutant loadings associated with the regulatory options that EPA considered for this proposal.

The financial and economic questions requested general information, such as location and employment, information on the sites's finances, and corporate structure. EPA used data received in response to these questions to estimate economic impacts on sites and companies from the regulatory options EPA considered for this proposal.

EPA used the cost survey to request detailed capital cost data on selected wastewater treatment systems installed since 1993, including equipment, engineering design, and installation costs. EPA incorporated these data into a cost model and used them to calculate compliance costs associated with the regulatory options EPA considered for this proposal.

The analytical and production survey requested detailed daily analytical and flow rate data for selected sampling points and monthly production data and operating hours for selected manufacturing operations. The Agency used the analytical data to estimate baseline pollutant loadings and pollutant removals from facilities with treatment in place resembling projected regulatory options and to evaluate the variability associated with iron and steel industry discharges. The Agency used the production data collected to evaluate the production basis for applying today's proposed rule in NPDES permits and pretreatment control mechanisms.

b. *Development of Survey Mailing List.* EPA has collected industry supplied data from the iron and steel industry through survey questionnaires. The iron and steel industry survey questionnaires were sent by mail to a random sample of facilities that were identified from the following sources:

Association of Iron and Steel Engineers *1997 Directory: Iron and Steel Plants Volume 1, Plants and Facilities;*

Iron and Steel Works of the World (12th edition) directory;

Iron and Steel Society's *Steel Industry of Canada, Mexico, and the United States: Plant Locations* map;

Member lists from the following trade associations:

—American Coke and Coal Chemicals Institute
—American Galvanizers Association
—American Iron and Steel Institute
—American Wire Producers Association
—Cold Finished Steel Bar Institute
—Specialty Steel Industry of North America
—Steel Manufacturers Association
—Steel Tube Industry of North America
—Wire Association International;

Dun and Bradstreet Facility Index database; EPA Permit Compliance System (PCS) database;

EPA Toxic Release Inventory (TRI) database;

Iron and Steelmaker Journal ''Roundup'' editions;

33 Metalproducing Journal ''Roundup'' editions;

33 Metalproducing Journal ''Census of the North American Steel Industry''.

These sources were cross-referenced with one another to obtain site level information and to ensure the accuracy and applicability of each site's information before inclusion in the questionnaire mailing list. Based on these sources, EPA estimated there were 822 facilities generating iron and steel wastewater. These facilities include the ones that EPA proposes to include in the MP&M category regulated under part 438.

c. *Sample Selection.* To minimize the burden on the respondents to the survey questionnaire, EPA grouped the facilities into 12 strata by the type of manufacturing processes that took place in each facility, or if the facility presented a unique feature (strata 5 & 8). EPA intends that each stratum encompasses facilities with similar operations. This grouping of similar facilities is known as stratification. The stratification of the iron and steel industry is described in Table IV.D.1–1.

TABLE IV.D.1—IRON AND STEEL INDUSTRY STRATA

Stratum No.	Stratum name	No. of sites in stratum
1	Integrated steel sites with cokemaking	9
2	Integrated steel sites without cokemaking	12
3	Stand-alone cokemaking sites	16
4	Stand-alone direct-reduced ironmaking and sintering sites	5
5	Detailed survey certainty stratum [1]	60
6	Non-integrated steel sites	69
7	Stand-alone finishing sites and stand-alone hot forming sites	54
8	Short survey certainty stratum [2]	13
9	Stand-alone cold forming sites	62
10	Stand-alone pipe and tubes sites	164
11	Stand-alone hot coating sites	106
12	Stand-alone wire sites	252
Total		822

[1]This staturm encompasses facilities that otherwise would have included within stratum 6 and stratum 7.
[2]This stratum encompasses facilities that otherwise would have been included within strata 9 to 12.

Depending on the amount/type of information EPA determined it needed for this rulemaking and the number of facilities in a stratum, EPA either solicited information from all facilities within a stratum (i.e., performed a census) or selected a random sample of facilities within each stratum. EPA sent a survey to all the facilities in strata 5 and 8 because of the size, complexity, or uniqueness of the steel operations present at these sites. EPA also sent surveys to all the facilities in strata 1 though 4 because of their manageable numbers and because of the size, complexity, and uniqueness of steel operation present. The remaining sites in strata 6, 7, and 9 through 12 were statistically sampled. If the stratum was censused, those facilities based on the facility's probability of selection represent themselves only. For statistically sampled strata, the selected facility is given a survey weight that allows it to represent itself and other facilities, within that stratum, that were not selected to receive a survey questionnaire. See the *Statistical Support Document for the Effluent Limitations Guidelines and Standards for Iron and Steel Industry.*

d. *Survey Response.* Of the 822 facilities generating iron and steel wastewater, 399 facilities were mailed either a detailed survey or a short survey questionnaire.

Eleven sites receiving a survey did not return a completed survey and thus are considered non-respondents. Ten sites receiving surveys were not considered for further review: seven of these sites were closed, two sites were considered part of another site owned by the same company, and one site received two surveys under two mailing addresses. EPA received 378 completed surveys, including 33 sites that certified that they were not engaged in iron and steel activities.

One hundred fifty-four of the completed surveys were from sites that EPA later determined to be within the scope of the MP&M Category; EPA did not consider those responses for this proposal. Similarly, two recipients of MP&M surveys were determined to be within the scope of the Iron and Steel Category. See Section III.B for a discussion of the applicability interface between these two rules. Therefore, 191 completed iron and steel surveys and the two MP&M surveys were used in the development of today's proposed rule.

In addition to the Detailed and Short Form surveys, follow-up surveys regarding treatment system capital costs and analytical and production data were also mailed. Of the 90 Cost Surveys mailed, 88 were completed. All of the 38 Analytical and Production Surveys were completed. EPA has included in the public record all information collected for which the site has not asserted a claim of Confidential Business Information.

2. Wastewater Sampling and Site Visits

EPA visited 70 iron and steel sites in 19 states and Canada between 1997 and 1999 to collect information about each site's operations, process wastewater management practices, and wastewater treatment systems, and to evaluate each facility for potential inclusion in the sampling program. Site visit selection was based on the type of site (as described in Section IV.C), the manufacturing operations at each facility, the type of steel produced (carbon, alloy, stainless), and the wastewater treatment operations.

EPA collected detailed information from the sites visited such as the operations associated with each manufacturing process, wastewater generation, in-process treatment and recycling systems, end-of-pipe treatment technologies, and, if the facility was a candidate for sampling, the logistics of collecting samples. EPA has included in the public record all information collected during site visits for which the site has not asserted a claim of Confidential Business Information.

Based on the information obtained during site visits, EPA selected 16 facilities to perform wastewater sampling. EPA selected sites for sampling using the following criteria:

- The site performed iron and steel operations representative of iron and steel industry facilities;
- The site performed high-rate recycling, in-process treatment, or end-of-pipe treatment technologies that EPA was considering for technology option development; and
- The site's compliance monitoring data indicated that it was operating among the better performing treatment systems in the industry or that it contained wastewater treatment process for which EPA sought data for option development.

During each sampling episode, EPA collected samples of untreated process wastewater, treatment system effluents, and other samples that would demonstrate the performance of individual treatment units. Samples were analyzed for approximately 300 analytes spanning the following pollutant classes: conventional and nonconventional pollutants, metals, volatile organics, semivolatile organics, and dioxins and furans. Analytical results from untreated samples contributed to EPA's characterization of the industry, development of the list of pollutants of concern, and development of raw wastewater characteristics. EPA used all collected data to evaluate treatment system performance and to develop discharge concentrations, pollutant loadings, and the treatment technology options for the iron and steel industry (see Section V). EPA used data collected from the effluent points to calculate the long-term averages (LTAs) and limitations for each of the proposed regulatory options (see Section IX.A.3); EPA also used industry-provided data from the Analytical and Production Survey to complement the sampling data for these calculations. During each sampling episode, EPA also collected flow rate data corresponding to each sample collected and production information from each associated manufacturing operation for use in calculating pollutant loadings and production-normalized flow rates. EPA has included in the public record all information collected for which the site has not asserted a claim of Confidential Business Information.

3. Analytical Methods

Section 304(h) of the Clean Water Act directs EPA to promulgate guidelines establishing test procedures (methods) for the analysis of pollutants. These methods allow the analyst to determine the presence and concentration of pollutants in wastewater, and are used for compliance monitoring and for filing applications for the NPDES program under 40 CFR 122.21, 122.41, 122.44, and 123.25, and for the implementation of the pretreatment standards under 40 CFR 403.10 and 403.12. To date, EPA has promulgated methods for all conventional and toxic pollutants and for several nonconventional pollutants. Table I–B at 40 CFR part 136 lists the analytical methods approved for the five conventional pollutants. Part 136 also sets forth the analytical methods for toxic pollutants. EPA has listed, pursuant to section 307(a)(1) of the Act, 65 metals and organic pollutants and classes of pollutants as "toxic pollutants" at 40 CFR 401.15. From the list of 65 classes of toxic pollutants, EPA identified a list of 126 "Priority Pollutants." This list of Priority Pollutants is shown at 40 CFR part 423, appendix A. The list includes non-pesticide organic pollutants, metal pollutants, cyanide, asbestos, and pesticide pollutants.

Currently approved methods for metals and cyanide are included in the table of approved inorganic test procedures at 40 CFR 136.3, Table I–B. Table I–C at 40 CFR 136.3 lists approved methods for measurement of non-pesticide organic pollutants, and Table I–D lists approved methods for the toxic pesticide pollutants and for other pesticide pollutants. Direct and indirect dischargers must use the test methods approved under 40 CFR 136.3, where available, to monitor pollutant discharges from the Iron and Steel industry, unless specified otherwise in part 420 or by the permitting authority. See 40 CFR 122.44 (i)(1)(iv) and 403.12(b)(5)(vi). Sometimes, methods in part 136 apply only to waste streams from specified point source categories. For pollutants with no methods approved under 40 CFR part 136, the discharger must use the test procedure specified in the permit or, in the case of indirect dischargers, other validated methods or applicable procedures. See 40 CFR 122.44 (i)(1)(iv) and 403.12(b)(5)(vi).

4. Data Sources

EPA evaluated existing data sources to gather technical and financial information and to identify potential survey recipients and facilities for site visits.

The Agency gathered technical information from iron and steel industry trade journals published from 1985 through 1997 as well as information from Iron and Steel Society Conference Proceedings. Trade journals included Iron and Steel Engineer, published by the Association of Iron and Steel Engineers (AISE); Iron and Steelmaker, published by the Iron and Steel Society (ISS); and New Steel (formerly Iron Age), published by Chilton Publications. These sources provided background information on industry storm water and wastewater issues; new and existing wastewater treatment technologies; wastewater treatment and manufacturing equipment upgrades and installations; company mergers, acquisitions, and joint ventures; and identified potential survey recipients and facilities for site visits.

EPA consulted the U.S. Bureau of Census publications, Census Manufacturers—Industry Series and Current Industrial Reports; the Paine Webber publication, World Steel Dynamics; and the American Iron and Steel Institute (AISI) publication, The Annual Statistical Report. These sources provided a variety of financial information, ranging from aggregate data on employment and payroll to steel shipments by product, grade, and market.

The Agency performed searches on the following on-line databases: Pollution Abstracts, Water Resources Abstracts, Engineering Index, Materials Business File, National Technical Information Service (NTIS), Enviroline, Compendex, and Metadex. The Agency also searched EPA's Toxic Release Inventory and Permit Compliance System. In addition, the Agency conducted a review of secondary sources, which include data, reports, and analyses published by government agencies; reports and analyses published by the iron and steel industry and its associated organizations; and publicly available financial information compiled by both government and private organizations.

5. Summary of Public Participation

EPA has strived to encourage the participation of all interested parties throughout the development of the proposed iron and steel effluent limitations guidelines and standards. EPA has conducted outreach with the following trade associations (which represent the vast majority of the facilities that will be affected by this guideline): American Iron and Steel Institute (AISI), Steel Manufacturers Association (SMA), Specialty Steel Industry of North America (SSINA), Cold Finished Steel Bar Institute (CFSBI), the Wire Association International, Incorporated (WAI), the American Wire Producers Association (AWPA), the Steel Tube Institute of North America (STINA), the American Galvanizers Association, Incorporated (AGA), and the American Coke and Coal Chemicals Association (ACCCI). EPA has met on several occasions with various industry representatives, including the AISI, SMA, AWPA, and STINA, to discuss aspects of the regulation development. EPA has also participated in industry meetings, giving presentations on the status of the regulation development on numerous occasions.

Because some facilities affected by this proposal are indirect dischargers, the Agency also conducted outreach to publicly owned treatment works (POTWs). EPA also made a concerted effort to consult with pretreatment coordinators and state and local entities that will be responsible for implementing this regulation.

EPA sponsored five stakeholders' meetings between December 1998 and January 2000. Four were in Washington, DC, and the fifth was in Chicago, IL. The primary objectives of the meetings were to present the Agency's current thinking regarding the technology bases for today's proposed revisions to 40 CFR part 420 and to solicit comments, issues, and new ideas from interested stakeholders, including members of environmental groups such as the Natural Resources Defense Council, the Environmental Defense Fund (now Environmental Defense), Atlantic States Legal Foundation, Friends of the Earth, and Save the Dunes.

During the meetings, EPA presented process flow diagrams showing preliminary technology options and potential best management practices (BMPs) that may be incorporated into a revised part 420 and/or included in National Pollutant Discharge Elimination System (NPDES) permit and pretreatment guidance. The presentations were organized by type of manufacturing process. A discussion period followed each presentation. In addition to soliciting comments on the preliminary options, EPA requested ideas from the stakeholders to identify useful incentives for greater pollution control.

At the meeting, EPA encouraged participants to supplement their oral statements with written comments and supporting data. In that regard, EPA provided a set of data-quality protocols for use when submitting data for this rulemaking effort. This handout, along with all other handouts and meeting summaries, are posted on the EPA Iron and Steel web site at http://www.epa.gov/OST/ironsteel/. All of the materials presented at the stakeholders' meetings, as well as meeting summaries and any written comments from participants, also may be found in the public record for today's proposal.

E. Subcategorization

1. Methodology and Factors Considered in Developing Proposed Subcategorization

The CWA requires EPA, when developing effluent limitations guidelines and standards, to consider a number of different factors. For example, when developing limitations that represent the best available technology economically achievable for a particular industry category, EPA must consider, among other factors, the age of the equipment and facilities in the category, location, manufacturing processes employed, types of treatment technology to reduce effluent discharges, the cost of effluent reductions and non-water quality environmental impacts. See section 304(b)(2)(B) of the CWA, 33 U.S.C. 1314(b)(2)(B). The statute also authorizes EPA to take into account other factors that the Administrator deems appropriate and requires BAT model technology chosen by EPA to be economically achievable, which generally involves consideration of both compliance costs and the overall financial condition of the industry.

EPA took these factors into account in considering whether different effluent limitations guidelines and standards were appropriate for subcategories within the industry. For example, EPA broke down categories of industries into separate classes with similar characteristics. This classification recognized the major differences among companies within an industry that may reflect, for example, different manufacturing processes, economies of scale, or other factors. Subdividing an industry by subcategories results in developing more tailored regulatory standards, thereby increasing regulatory practicability and diminishing the need to address variations among facilities through a variance process. See *Weyerhaeuser Co.* v. *Costle,* 590 F.2d 1011, 1053 (D.C. Cir. 1978).

For this iron and steel rulemaking, EPA used industry survey data and EPA sampling data for the subcategorization analysis. Various subcategorization criteria were analyzed for trends in discharge flow rates, pollutant concentrations, and treatability to determine where subcategorization was warranted. Equipment and facility age were not found to impact wastewater generation or wastewater characteristics; therefore, age was not used as a basis for subcategorization. Location impacts iron and steel facilities only in that facilities located in arid regions tend to experience greater water loss through evaporation, resulting in reduced discharge in some cases. EPA addressed this difference by selecting flow allowances for today's proposed regulation that are achievable in all regions of the country irrespective of climate. Therefore, the Agency deemed location to be insufficient grounds for subcategorization. Size (*e.g.,* acreage, number of employees) was not used as a subcategorization criterion because it did not have an influence on production-normalized wastewater flow rates or pollutant loadings. Economic impacts are discussed in Section VI and with one exception did not show a need for subcategorization on this basis. The exception is subpart E (the Integrated and Stand Alone Hot Forming subcategory) for which EPA is proposing alternative BAT approaches to account for possible economic issues. See Section IX.E.1. While non-water quality environmental characteristics (solid waste and air emission effects) are of concern to EPA, these characteristics did not constitute a basis for subcategorization. Environmental impacts from solid waste disposal and from the transport of potentially hazardous wastewater are dependant on individual facility practices; EPA could not identify any common characteristics particular to a given segment of the industry. Air emissions also provided EPA with no basis for different treatment than those suggested by the prevailing factors.

EPA identified manufacturing processes as the determinative factor for subcategorization. In addition, EPA used manufacturing processes, type of product, and wastewater characteristics (*i.e.,* production-normalized flow rates, pollutants present) to establish segments within each subcategory where appropriate. The following section describes the iron and steel manufacturing processes.

2. General Description of Manufacturing Processes

The Iron and Steel Category covers sites that generate wastewater while performing one or more of the following industrial activities: Cokemaking, sintering, ironmaking, steelmaking, vacuum degassing, ladle metallurgy, casting, hot forming, finishing processes (which include salt bath descaling, acid pickling, cold rolling, annealing, alkaline cleaning, hot coating, and electroplating), direct-reduced ironmaking, briquetting, and forging. The following is a brief description of each of these manufacturing processes.

Cokemaking: Carbon in the form of metallurgical coke is used to reduce beneficiated iron ores and other forms of iron oxides to metallic iron in blast furnaces. In by-product coke plants, coal is distilled in refractory-lined, slot-type ovens at high temperatures in the absence of air. The moisture and volatile components of the coal are collected and processed to recover by-products, including crude coal tars, crude light oil (aromatics, paraffins, cycloparaffins and naphthenes, sulfur compounds, nitrogen and oxygen compounds), anhydrous ammonia or ammonium sulfate, naphthalene, and sodium phenolate. Wastewater is generated from moisture contained in the coal charge to the coke ovens (waste ammonia liquor) and from some of the by-product recovery operations.

Two cokemaking operations in the U.S. use nonrecovery technology. Both plants use Sun Coke Company's proprietary non-recovery technology. These plants use negative pressure coke ovens to prevent leakage of air/smoke to the atmosphere, and higher temperatures to destroy volatile organics. The organic compounds are destroyed within the oven during the cokemaking process. The nonrecovery cokemaking process does not generate any process wastewater.

Sintering: Sinter plants are used to beneficiate (upgrade the iron content of) iron ores and to recover iron values from wastewater treatment sludges and mill scale generated at integrated steel mills. A mixture of coke breeze (fine coke particles), iron ores, sludges, mill scales, and limestone are charged to a traveling grate furnace. The mixture is ignited and air is drawn through the bed as it travels toward the exit end. Sinter of suitable size and weight is formed for charging to the blast furnace. Wastewaters are generated from wet air pollution control devices on the wind box and discharge ends of the sinter machine.

Ironmaking: Blast furnaces are used to produce molten iron, which makes up about two-thirds of the charge to basic oxygen steelmaking furnaces. The raw materials charged to the top of the blast furnace include coke, limestone, beneficiated iron ores, and sinter. Hot blast (preheated air) is blown into the bottom of the furnace. Molten iron is tapped into refractory-lined cars for transport to the steelmaking furnaces. Molten slag, which floats on top of the molten iron, is also tapped and processed for sale as a by-product.

The hot blast exits the furnace top as blast furnace gas in enclosed piping and is cleaned and cooled in a combination of dry dust catchers and high-energy venturi scrubbers. Direct contact water used in the gas coolers and high-energy scrubbers comprises nearly all of the wastewater from blast furnace operations.

Steelmaking: Steelmaking in the U.S. is conducted either in basic oxygen furnaces (BOFs) or electric arc furnaces (EAFs). BOFs are typically used for high tonnage production of carbon steels at integrated mills; EAFs are used to produce carbon steels and low tonnage alloy and specialty steels at non-integrated mills.

Integrated steel mills use BOFs to refine a metallic charge consisting of approximately two-thirds molten iron and one-third steel scrap by oxidizing silicon, carbon, manganese, phosphorus and a portion of the iron. Oxygen is injected into the molten bath. Off-gases from BOFs in the U.S. are controlled by one of three methods:

Semi-wet: Furnace off-gases are conditioned with moisture prior to processing in electrostatic precipitators;

Wet-open combustion: Excess air is admitted to the off-gas collection system allowing carbon monoxide to combust prior to high-energy wet scrubbing for air pollution control; and

Wet-suppressed combustion: Excess air is not admitted to the off-gas collection system prior to high-energy wet scrubbing for air pollution control.

Non-integrated mills use EAFs to melt and refine a metallic charge of scrap steel. Most EAFs are operated with dry air cleaning systems with no process wastewater discharges. There are a small number of wet and semi-wet systems.

Vacuum degassing: In this batch process, molten steel is subjected to a vacuum for composition control, temperature control, deoxidation, degassing, decarburization, and to otherwise remove impurities from the steel. Oxygen and hydrogen are the principal gases removed from the steel. In most degassing systems, vacuum is provided by barometric condensers; thus, direct contact between the gases and the barometric water occurs.

Ladle metallurgy: In this batch process, molten steel is refined in addition to, or in place of, vacuum degassing. These operations include argon bubbling, argon-oxygen decarburization (AOD), electroslag remelting (ESR), and lance injection. These additional refining operations do not use process water.

Casting: Molten steel is tapped from the BOF or EAF into ladles for transport. From the ladles, the molten steel is either processed in ladle metallurgy stations and/or vacuum degassers prior to casting into semi-finished shapes in continuous casters. Less than ten per cent of the steel produced in the United States is cast into ingots. Steel cast into ingot molds must undergo cooling, mold stripping, reheating, and primary hot rolling to produce the same semi-finished shape that can be produced with continuous casting. The continuous casting machine includes a tundish (receiving vessel for molten steel), water-cooled molds, secondary cooling water sprays, containment rolls, oxygen-acetylene torches for cutoff, and a runout table. Molten steel is transferred from the ladle to the tundish and then to the water-cooled molds at controlled rates. The steel solidifies as it passes through the molds and is cut to length on the runout table. Wastewater is generated by a direct contact water system used for spray cooling and for flume flushing to transport scale from below the caster runout table.

Hot forming: Ingots, blooms, billets, slabs, or rounds are heated to rolling temperatures in gas-fired or oil-fired reheat furnaces, and formed under mechanical pressure with work rolls to produce semi-finished shapes for further hot or cold rolling, or finished shapes for shipment. Process water is used for scale breaking, flume flushing, and direct contact cooling.

Finishing processes: These processes include salt bath and electrolytic sodium sulfate descaling, acid pickling, cold forming, annealing, cleaning, and hot coating and electroplating:

Salt bath descaling—Oxidizing and reducing molten salt baths are used to remove heavy scale from specialty and high-alloy steels. Process wastewaters originate from quenching and rinsing operations conducted after processing in the molten salt baths.

Electrolytic sodium sulfate descaling is performed on stainless steels for essentially the same purposes as salt bath descaling.

Acid pickling—Solutions of hydrochloric, sulfuric, hydrofluoric/nitric and nitric acids are used to remove oxide scale from the surfaces of semi-finished products prior to further processing by cold rolling, cold drawing, and subsequent cleaning and coating operations. Process wastewaters include spent pickling acids, rinse waters, and pickling line fume scrubbers.

Cold rolling—Cold rolling is conducted on hot rolled and pickled steels at ambient temperatures to impart desired mechanical and surface properties in the steel. Process wastewater results from using synthetic or animal-fat based rolling solutions, many of which are proprietary.

Annealing—Annealing is a heat treatment process performed to relieve stresses, increase softness, ductility, and toughness, and/or to produce a specific microstructure to the steel. It is performed in a batch or continuous process. Batch processes do not use process water. Wastewaters from continuous processes result principally from associated alkaline cleaning operations and quenching.

Hot coating—Immersion of precleaned steel into baths of molten metal. Common metal types include: Tin, zinc (galvanizing), combinations of lead and tin (terne coating), and combinations of aluminum and zinc. Hot coating is typically used to improve resistance to corrosion, and for some products, to improve appearance and paintability. Wastewaters result principally from cleaning operations prior to the molten bath.

Electroplating—Immersion of precleaned steel into baths for the purpose of electrodepositing a metal onto the steel surface. Common metal types include: tin, chromium, zinc, and nickel. Process wastewaters include spent plating baths, rinse waters, and blowdowns from fume scrubbers.

Direct-reduced ironmaking (DRI): This process produces relatively pure iron by reducing iron ore in a furnace below the melting point of the iron produced. DRI is used as a substitute for scrap steel in EAFs to minimize contaminant levels in the melted steel and to allow economic steel production when market prices for scrap are high. Process wastewaters are generated from air pollution control devices.

Briquetting: The process of agglomerating or forming materials into discrete shapes of sufficient size, strength, and weight for charging to a subsequent process (*e.g.,* briquetting wastewater sludges for charging to a blast furnace). Briquetting does not generate process wastewaters.

Forging: A hot forming operation in which a metal piece is shaped by hammering. Process wastewaters are generated in the form of direct contact cooling water.

3. Proposed Subcategories

In today's notice, EPA proposes to discard the current subcategorization scheme and to establish seven new subcategories for the iron and steel industry. The proposed revised subcategorization not only reflects the modern state of the industry, in terms of both process and wastewater management, but it also incorporates the experience that the Agency and other regulatory entities have gained from implementing the current iron and steel effluent limitations guidelines and standards. Additionally, the proposed revised subcategorization simplifies the regulatory structure by reflecting co-treatment of compatible wastewaters, which is currently practiced by the industry. This practice also provides economic advantage because compatible pollutants from different manufacturing processes can be treated in a single treatment unit. The seven revised subcategories proposed for the iron and steel rulemaking are as follows:

- Cokemaking
- Ironmaking
- Integrated Steelmaking
- Integrated Hot Forming—Stand Alone Hot Forming Mills
- Non-Integrated Steelmaking and Hot Forming Operations
- Steel Finishing Operations
- Other Operations

The following table presents a comparison of the current subcategorization scheme and the one being proposed today:

TABLE IV.E.1.—SUBCATEGORY COMPARISON OF CURRENT AND PROPOSED REGULATIONS

Current regulation	Proposed regulation	
A. Cokemaking	A. Cokemaking	
B. Sintering	B. Ironmaking	
C. Ironmaking		
D. Steelmaking	C. Integrated Steelmaking	E. Non-Integrated Steelmaking and Hot Forming
E. Vacuum Degassing		
F. Continuous Casting		
G. Hot Forming	D. Integrated and Stand-Alone Hot Forming	
H. Salt Bath Descaling	F. Steel Finishing	
I. Acid Pickling		
J. Cold Forming		
K. Alkaline Cleaning		
L. Hot Coating		
	G. Other Operations	

Each subcategory is described in more detail immediately below in terms of its manufacturing processes and wastewater characteristics. Some subcategories are further segmented to reflect differences in manufacturing operations, wastewater characteristics, or required treatment technologies.

Cokemaking—Subpart A

Subcategory	Segment
A: Cokemaking Operations.	By-Product Other (Non-recovery, etc.)

Cokemaking is proposed as a subcategory because of the uniqueness of the manufacturing processes within the iron and steel industry and the characteristics of wastewaters generated by by-product cokemaking operations. EPA proposes to drop the current segmentation on the basis of ''iron and steel'' and ''merchant'' coke plants because differences in wastewater flow rates observed in the 1982 rulemaking are no longer apparent within the current population of by-product coke plants.

Cokemaking operations are segmented into by-product and other operations, which comprise currently non-recovery and heat-recovery coke plants. Any new cokemaking technologies would fall in this segment. This segmentation reflects the fundamental differences in the respective manufacturing processes. The by-product cokemaking technology provides for extensive processing of materials derived from the coal charged to the coke ovens, including coke oven gas and coal tars, as well as light oils and ammonia or ammonia compounds. The cokemaking process itself generates a waste ammonia liquor made up of the moisture from the coal and volatile and semi-volatile organic compounds. Other wastewaters are generated from the by-product recovery operations. Non-recovery and heat-recovery coke plants, on the other hand, do not generate process wastewaters. Only limited amounts of non-process wastewaters in the form of boiler blowdown result from these operations.

Ironmaking—Subpart B

Subcategory	Segment
B: Ironmaking Operations.	Blast Furnace Sintering

The proposed ironmaking subcategory comprises sintering and blast furnace operations. Wastewaters result from wet air pollution control systems at sinter plants and wet gas cleaning systems for blast furnaces. The wastewaters are similar in character in terms of the pollutants present (ammonia, cyanide, phenolic compounds and metals) and are universally co-treated where wet sinter plants are co-located with blast furnaces. The subcategory is segmented to take into account differences in the model treatment system flow rates used to develop the proposed effluent limitations guidelines and standards.

Integrated Steelmaking—Subpart C

The proposed integrated steelmaking subcategory comprises four manufacturing processes: Basic Oxygen Furnace (BOF) steelmaking, ladle metallurgy, vacuum degassing, and continuous casting. Section IV.E.2 describes these processes in more details. The wastewater generated from the integrated steelmaking operations originates from wet scrubbing for air pollution control of the BOF process, direct contact water with gases from the vacuum degassing process, and direct contact water used for spray cooling and for flume flushing to transport scale from the casting process. Although these processes differ in wastewater flow rates per ton of production, their wastewaters can be and are commonly co-treated. The proposed limitations for this subcategory are based on a single treatment technology but reflect different production normalized flow rates for each process.

This proposed subcategory would encompass steelmaking operations at integrated mills and at non-integrated mills operating basic oxygen furnaces. Currently, one BOF shop is operated at a non-integrated mill and would be included in this proposed subcategory.

Integrated and Stand-Alone Hot Forming Mills—Subpart D

Subcategory	Segment
D: Integrated and Stand-Alone Hot Forming Mills.	Carbon and Alloy Stainless

This proposed subcategory would encompass hot forming operations at integrated and stand-alone hot forming mills. The wastewater generated from the proposed integrated and stand-alone hot forming subcategory originates from process water used for scale braking, flume flushing, and direct contact cooling. Although these processes differ in wastewater flow rates per ton of production, their wastewaters can be and are commonly co-treated. The proposed limitations for this subcategory are based on a single treatment technology but reflect different production normalized flow rates for each process.

EPA proposes to divide the integrated and stand-alone hot forming mills subcategory into two segments—carbon and alloy steel and stainless steel—in order to account for the different product types and wastewater characteristics. Both segments produce steel in primary, section, flat, pipe, or tube.

Non-Integrated Steelmaking and Hot Forming Operations—-Subpart E

Subcategory	Segment
E: Non-Integrated Steelmaking and Hot Forming Operations.	Carbon and Alloy Stainless

This proposed subcategory would encompass steelmaking and hot forming operations at non-integrated mills. The wastewater generated from this proposed subcategory originates from the air pollution control process of EAFs, direct contact water with gases in the vacuum degassing process; direct contact water used for spray cooling and for flume flushing to transport scale in the casting process; and process water used for scale braking, flume flushing, and direct contact cooling in the hot forming process. EPA proposes to divide the non-integrated steelmaking and hot forming operations subcategory into two segments—carbon and alloy steel operations and stainless steel operations—because of the difference in product types and in the wastewater characteristics. Each segment encompasses the following manufacturing processes: EAF steelmaking, ladle metallurgy, vacuum degassing, continuous casting, and hot forming. Although these processes differ in wastewater flow rates per ton of production, their wastewaters can be and are commonly co-treated. The proposed limitations for this subcategory are based on a single treatment technology but reflect different production normalized flow rates for each process.

Steel Finishing Operations—Subpart F

Subcategory	Segment
F: Steel Finishing Operations.	Carbon and Alloy Stainless

This proposed subcategory would encompass all finishing operations that take place at integrated, non-integrated, and stand-alone mills. The wastewater generated from the proposed steel finishing subcategory originates from cleaning, rinsing, and quenching operations, spent solution from the acid pickling, alkaline cleaning, and electroplating operations, fume scrubber wastewater, and process water resulting from the use of synthetic or animal-fat based solutions. EPA proposes to segment the steel finishing subcategory into carbon and alloy steel operations and stainless steel operations because of the nature of the steel finishing operations and the associated wastewater characteristics. Each segment may include a combination of the following processes: acid pickling and other descaling, cold forming, alkaline cleaning, hot coating, and electroplating. Section IV.E.2 describes these manufacturing processes in more detail. Although these processes differ in wastewater flow rates per ton of production, their wastewaters can be and are commonly co-treated. The proposed limitations for this subcategory are based on a single treatment technology but reflect different production normalized flow rates for each process.

Other Operations—Subpart G

Subcategory	Segment
G: Other Operations	Direct-Reduced Ironmaking Forging Briquetting

EPA proposes to combine the three remaining iron and steel operations in a single catch-all subcategory with segments for three specific operations: direct-reduced ironmaking (DRI), forging, and briquetting. Section IV.E.2 describes these manufacturing processes in more detail. The three segments differ in manufacturing operations and in waste generation and characteristics. DRI operations currently take place at stand-alone facilities and non-integrated mills. Forging operations take place at stand-alone and non-integrated mills. Briquetting operations take place at integrated and non-integrated mills. The wastewater generated from this proposed subcategory originates from fume scrubbers from the DRI process and direct contact cooling water from the forging process.

F. Wastewater Characterization

The following sections present wastewater sources, pollutants of concern, and flow rates for each proposed subcategory. Estimates for pollutant loadings are presented in Section V.C.

The principal purpose of identifying subcategory-specific pollutants of concern (POCs) is to screen pollutants for possible regulation. Such pollutants may be either conventional, priority, or non-conventional pollutants as defined by the Clean Water Act, and may be limited directly in part 420, or limited indirectly through control of other pollutants. The Agency took the following approach to identify POCs and, thereafter, to narrow that list to those pollutants that are proposed for regulation.

As the first step, EPA conducted a sampling and analytical program at 16 steel industry sites. EPA sampled and analyzed a broad list of pollutants for purposes of identifying pollutants present in wastewaters from each type of process operation and determining their fate in industry wastewater treatment systems. As the next step, EPA determined for each pollutant subject to the sampling and analytical program whether it met the following detection criteria in wastewaters from that subcategory:

- The pollutant was detected at greater than or equal to ten times the analytical minimum level (ML) concentration in at least 10 percent of all untreated process wastewater samples; and
- The mean detected concentration in untreated process wastewater samples was greater than the mean detected concentration in the source water samples.

EPA identified as pollutants of concern all pollutants that met these screening criteria. EPA's final step was to determine which of these pollutants to regulate, either directly through promulgated limitations and standards or indirectly through the control of another pollutant (*e.g.,* an indicator or surrogate). Of the POCs identified by EPA, the Agency is proposing not to regulate those that were detected at environmentally insignificant concentrations; those typically not associated with process wastewaters from specific process operations; and those that were detected at low concentrations, but determined to be below treatability levels for those pollutants.

The Agency considered three pollutants as POCs for all subcategories, independent of the above criteria: total suspended solids (TSS), Oil and Grease measured as hexane extractable material (HEM), and total petroleum hydrocarbons measured as silica gel treated-hexane extractable material (SGT–HEM). These pollutants are present to some degree in nearly all steel industry process wastewaters and are important indicators of overall wastewater treatment system performance. The pH level is also an important wastewater characteristic and an important indicator of wastewater treatment system performance in many applications in the steel industry. Therefore, EPA is proposing to regulate pH in today's proposed rule. However, EPA did not evaluate pH for the purposes of the Agency's effluent reduction benefit or cost-effectiveness analyses, since pH is not expressed in terms of quantity or concentration.

This section also discusses the Agency's methodology for selecting the process wastewater flow rate for each manufacturing operation that corresponds to the best available technology for the particular subcategory or segment. These flow rates are expressed in terms of gallons of water discharged per ton of production (gpt) for all operations except with respect to certain wet air pollution control devices for steel finishing operations where the flow rates are expressed in gallons per minute (gpm).

For those manufacturing operations where high-rate recycle is a principal component of the model BAT, NSPS, PSES, or PSNS treatment systems, the Agency has selected production-normalized flow rates (PNFs) on the basis of best demonstrated flows achievable by the subcategory or segment as a whole. (For some segments, the best demonstrated flow for the subcategory as a whole is zero.) In these systems, the owner or operator directly controls the volume of the discharge by controlling the process water treatment and recycle system. This is accomplished by managing the amounts of make-up water and storm water entering the system; removing and/or minimizing the potential for once-through non-process wastewaters entering the system; and by controlling recirculating water chemistry to prevent fouling and scaling, where necessary. In general, the PNFs for these subcategories/segments have been significantly reduced for the proposed standards, relative to those on which the original standards are based. This means that the proposed mass-based standards are significantly tighter than existing standards, even where the wastewater treatment technology on which the standards are based has not changed. A detailed presentation of the PNFs on which the existing standards are based can be found in Section VII of the Technical Development Document.

For those manufacturing operations where high-rate recycle is not a principal component of the model BAT, NSPS, PSES, or PSNS treatment systems, the Agency has chosen to use a PNF representing the PNFs reported by the better performing facilities in those subcategories and segments. In general, these also represent reductions in the PNFs used to derive the existing standards, although not by as much as for the subcategories/segments where high-rate recycle is part of the proposed technology basis. EPA recognizes that in some cases, the PNFs selected by the Agency may not be appropriate for all mills within a subcategory or manufacturing process subdivision. Therefore, the Agency solicits comments and supporting information and data regarding alternative PNFs that may be appropriate for particular manufacturing operations.

1. Cokemaking

a. *Wastewater Sources.* The proposed Cokemaking Subcategory encompasses segments for by-product and non-recovery cokemaking. Non-recovery cokemaking does not generate process wastewater. Wastewater from by-product cokemaking operations is generated from a number of sources. The greatest volume of wastewater generated at every by-product site is excess ammonia liquor, which is the condensed combination of coal moisture and volatile compounds liberated from the coal during the coking process. Nearly all sites reported other sources of wastewater, including: coke oven gas desulfurization, crude light oil recovery, ammonia still operation, final gas coolers, NESHAP controls for benzene, barometric condensers, coke oven gas condensates, equipment cleaning, and wet air pollution control devices used to control emissions from coal charging and coke pushing. Excess water used for coke quenching is another wastewater source. Water used for coke quenching is typically plant service water or treated coke plant wastewater. EPA does not advocate the practice of coke quenching with untreated wastewater because of potential air pollution and ground water contamination associated with this practice. Most plants now collect and treat some process area storm water and at least one facility collects and treats contaminated ground water from its coke plant ground water remediation system.

b. *Pollutants of Concern.* From sampling data and industry-provided data from the Analytical and Production Survey, EPA determined that by-product cokemaking wastewaters contain oil & grease, ammonia-N, cyanides, thiocyanates, phenolics, benzene, toluene, xylene, benzo(a)pyrene, and numerous other volatile organic compounds and polynuclear aromatic compounds. From these data, EPA identified 74 POCs for the Cokemaking Subcategory: 4 conventionals, 1 non-conventional metal, 30 non-conventional organics, 10 other non-conventionals, 22 priority organics, 3 priority metals, 1 other priority pollutant (total cyanide), biochemical oxygen demand (BOD), total Kjeldahl nitrogen (TKN), and nitrate/nitrite-N as POCs (the last three because of their importance as indicators of biological treatment effectiveness).

c. Wastewater Flow Rates. The median volume of process wastewater generated at well-operated by-product coke plants is approximately 100 to 110 gallons per ton (gpt) of coke and coke breeze produced. Approximately 30 to 40 gpt is excess ammonia liquor; the remaining flow comprises the other sources listed above. Operators of some direct discharging facilities often add up to 50 gpt of control water to their biological treatment systems to dilute wastewater toxicity and, to some extent, control temperature. The Agency is using a PNF for the by-product recovery cokemaking segment of 158 gpt. EPA is proposing that supplemental allowances be available to sites operating wet coke oven gas desulfurization systems (15 gpt) or NESHAP control systems (10 gpt). EPA believes that these PNFs can be achieved by all by-product recovery coke plants with good water management practices.

The Agency is using a PNF of 0 gpt of process wastewater for the non-recovery cokemaking segment.

2. Ironmaking

a. *Wastewater Sources.* The proposed Ironmaking Subcategory encompasses segments for sintering and blast furnace ironmaking. Wet air pollution control systems are the primary source of process wastewater at sinter plants. All of the sinter plants generating process wastewater reported using scrubbers to control wind box emissions and some sites also used scrubbers to control emissions at the discharge end of the sinter strand.

Gas cleaning systems that utilize high-energy scrubbers and gas coolers are the primary sources of process wastewater for blast furnace operations. Other, relatively minor sources of process wastewater include blast furnace gas seals, blast furnace drip legs. Some sites reported excess water from slag quenching.

b. *Pollutants of Concern.* Based on its analysis sampling data and industry-provided data from the Analytical and Production Survey, EPA determined that sintering wastewaters contain the following principal pollutants: TSS, O&G, ammonia-N, cyanide, phenolic compounds, and metals (principally lead and zinc), while the principal pollutants from blast furnaces are TSS, ammonia-N, cyanides, phenolic compounds, and metals (copper, lead, and zinc). EPA also found that sintering wastewaters contain polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurnas (PCDDs and PCDFs, or dioxins and furans).

EPA identified 28 POCs for the blast furnace segment of the Ironmaking Subcategory: 2 conventionals, 7 non-conventional metals, 1 non-conventional organic, 10 other non-conventionals, 6 priority metals, 1 other priority pollutant (total cyanide), and TKN because of its direct relationship to ammonia-N, a principal pollutant in ironmaking wastewaters.

EPA identified 66 POCs for the sintering segment of the Ironmaking Subcategory: 2 conventionals, 6 non-conventional metals, 24 non-conventional organics, 11 other non-conventionals, 11 priority organics, 10 priority metals, 1 other priority pollutant (total cyanide), and TKN because of its direct relationship to ammonia-N, a principal pollutant in ironmaking wastewaters.

EPA documented dioxins and furans in air emissions from two U.S. sinter plants, one with dry and one with wet air pollution control. These findings of PCDDs/PCDFs (dioxins) in air emissions from sintering are consistent with the results of studies in Europe and Scandinavia during the 1980s. On the basis of process considerations (*e.g.,* feed materials, combustion), EPA sampled for dioxins and furans in wastewaters from the following primary steelmaking operations: by-product coke plants, sinter plants, blast furnaces, and steelmaking basic oxygen furnaces. EPA found several dioxin and furan congeners in one of two sampled sinter plant treatment effluents. EPA did not find 2,3,7,8-TCDD, which is considered to be the most toxic of all dioxin and furan congeners. However, EPA did detect a furan congener in the form of 2,3,7,8-TCDF, as well as other congeners. In order to evaluate the toxicity of all of these congeners, EPA converted the detected quantities into values equivalent to the toxicity of 2,3,7,8-TCDD. Taken together, these dioxin and furan congeners are equivalent in toxicity to 0.09 nanograms/L of 2,3,7,8-TCDD. EPA thus considers these dioxin and furan congeners to be Pollutants of Concern for sinter plants with wet air pollution control technology under the ironmaking subcategory.

c. *Wastewater Flow Rates.* Nearly half of the operating sinter plants use dry air pollution control systems and, therefore, do not generate process wastewater. Discharge flow rates below 75 gpt are demonstrated at two of the six sinter plants with wet air pollution controls. Eight of the 24 blast furnaces achieve blowdown rates of 25 gpt and lower by operating high-rate (>95%) gas cleaning recycle systems. Several sites report zero discharge by using blowdown from gas cleaning systems for slag quenching. EPA does not advocate slag quenching with blast furnace process wastewaters because of documented ground water contamination associated with this practice. EPA is using a 75 gpt PNF for the sintering segment, representing a flow achievable by sites operating their process water systems at recycle rates equal to or greater than 95%, and 25 gpt for the blast furnaces segment, representing a flow achievable by sites operating their process water systems at recycle rates equal to or greater than 98%. The Agency believes that all sites can achieve these selected PNFs through good water management practices in blast furnace and sinter plant process water treatment and recycle systems.

3. Integrated Steelmaking

a. *Wastewater Sources.* The proposed Integrated Steelmaking Subcategory encompasses the following operations: BOF steelmaking, ladle metallurgy, vacuum degassing and continuous casting. Wet air pollution control systems are the primary process wastewater source from BOF steelmaking. Three types of wet air pollution control systems are used to control BOF emissions: Semi-wet, wet-open combustion, and wet-suppressed combustion. Some sites reported other BOF process wastewater sources including excess slag quenching water, and equipment cleaning water. Vacuum systems (*e.g.,* barometric condensers, steam ejectors) are the process wastewater source from vacuum degassing systems. Spray contact water systems used for product cooling and flume flushing are the largest process wastewater sources from continuous casters. Some sites reported other continuous casting process wastewater sources including torch table water and equipment cleaning water. Other process wastewater sources include intermittent water losses from closed caster mold and machine noncontact cooling water systems.

b. *Pollutants of Concern.* Based on its analysis of sampling data and industry-provided data from the Analytical and Production Survey, EPA determined that the principal pollutants from BOFs are TSS and metals (lead and zinc). Vacuum degassing wastewaters contain low levels of TSS and metals (lead and zinc) which volatilize from the steel. Casting wastewaters typically contain TSS, O&G measured as HEM, and low levels of particulate metals.

Using the POC selection criteria presented above, EPA identified the following 28 POCs for the Integrated Steelmaking Subcategory: 2 conventionals, 9 non-conventional metals, 6 other non-conventionals, 1 priority organic, and 10 priority metals.

c. *Wastewater Flow Rates.* Three types of wet air pollution control systems (semi-wet, wet-suppressed combustion, wet-open combustion) are commonly used in the BOF steelmaking operations, and each system has a different wastewater flow rate. EPA is using a PNF of 10 gpt for BOFs operating semi-wet systems. Half the operating BOFs operating semi-wet systems are discharging less than this amount. Some operators report achieving zero discharge by balancing the applied water for gas conditioning with evaporative losses. Two of eight BOFs operating wet-open combustion gas cleaning systems discharge less than 20 gpt, and two of the seven BOFs operating wet-suppressed combustion gas cleaning systems discharge less than 20 gpt. EPA is using a PNF for recycle system blowdown of 20 gpt at BOFs with wet-open combustion gas cleaning systems, and 20 gpt for BOFs equipped with wet-suppressed combustion gas cleaning systems. A small number of BOFs report achieving zero discharge, or very low discharge, but not all sites are able to achieve this because of safety considerations. Four of 12 sites operating vacuum degassing systems report a flow rate less than 15 gpt, and six of 29 continuous casters report a wastewater discharge rate less than or equal to 20 gpt. EPA is using a PNF of 15 gpt for vacuum degassing operations, and a PNF of 20 gpt for continuous casting operations.

4. Integrated and Stand-Alone Hot Forming

a. *Wastewater Sources.* The proposed Integrated and Stand-Alone Hot Forming subcategory consists of two segments: Carbon and alloy, and stainless. The primary process wastewater source for facilities in both segments is contact water systems used for scale removal, roll cooling, product cooling, flume flushing, and other line operations. Some sites reported other wastewater sources, including roll shops, basement sumps, lubricating oil conditioning systems, strip coilers, scarfer water, wet air pollution control systems, and equipment cleaning water.

b. *Pollutants of Concern.* Based on its analysis of sampling data and industry-provided data from the Analytical and Production Survey, EPA determined that the principal pollutants from integrated and stand-alone hot forming facilities are TSS, O&G measured as HEM, and low levels of particulate metals.

EPA identified the following 12 POCs for the carbon and alloy segment of the Integrated and Stand-Alone Hot Forming Subcategory: 1 conventional metal, 4 non-conventional metals, 4 other non-conventionals, and 3 priority metals. EPA identified the following 16 POCs for the stainless segment of the Integrated and Stand-Alone Hot Forming Subcategory: 2 conventionals, 4 non-conventional metals, 4 other non-conventionals, and 6 priority metals. Although EPA found lead at relatively low concentrations in sampled hot forming wastewaters, lead is considered as a POC for both segments of this subcategory because extensive industry-supplied data indicates lead exists in appreciable quantities in many hot forming wastewaters across the industry.

c. *Wastewater Flow Rates.* High-rate recycle, with recycle rates in excess of 95%, is a standard pollution prevention technique for all types of hot forming operations. Twenty-one of 68 integrated and stand-alone hot forming mills have reported flow rates less than or equal to 100 gpt. EPA is using a 100 gpt PNF at integrated and stand-alone hot forming mills. EPA has determined that 100 gpt PNF represents the best demonstrated flows at integrated and stand-alone hot forming mills that operate at a 95% recycle rate.

5. Non-Integrated Steelmaking and Hot Forming

a. *Wastewater Sources.* The proposed Non-Integrated Steelmaking and Hot Forming Subcategory consists of two segments: carbon and alloy, and stainless. These segments encompass the following operations: EAF (electric arc furnace) steelmaking, ladle metallurgy, vacuum degassing, continuous casting, and hot forming. All but one EAF in the United States are equipped with dry or semi-wet air pollution controls and operate with no process wastewater discharges. The process wastewater source from the one EAF with a wet air pollution control system is the scrubber water; however that facility is being converted to a dry air cleaning system, and no new EAFs are likely to be constructed with wet air controls. Accordingly, the Agency is not proposing separate limits for EAFs with wet air pollution controls. Any EAF constructed in the future with wet air controls will have to meet the limits for dry systems. The wastewater sources for non-integrated vacuum degassing, non-integrated continuous casting, and non-integrated hot forming are the same as those listed for operations at integrated and stand-alone facilities.

b. *Pollutants of Concern.* From sampling data and industry-provided data from the Analytical and Production Survey, EPA determined that the principal pollutants for vacuum degassing operations, continuous casters and hot forming mills are TSS and metals. O&G (measured as HEM and SGT–HEM) is found in process wastewaters from continuous casting and hot forming operations.

EPA identified the following 11 POCs for the carbon and alloy segment of the Non-Integrated Steelmaking and Hot Forming Subcategory: 2 conventionals, 1 non-conventional metal, 5 other non-conventionals, and 3 priority metals. EPA selected lead as a POC for the reasons set out above for integrated and stand-alone hot forming mills. EPA identified the following 23 POCs for the stainless segment of the Non-Integrated Steelmaking and Hot Forming Subcategory: 2 conventionals, 6 non-conventional metals, 7 other non-conventionals, 1 priority organic, and 7 priority metals. EPA selected lead as a POC for the reasons set out above for integrated and stand-alone hot forming mills.

c. *Wastewater Flow Rates.* Non-integrated mills have demonstrated lower discharge volumes than hot forming at integrated and stand alone mills because less water is used at these mills. Two types of air pollution control systems (semi-wet, and dry) are commonly used in the EAF steelmaking operations, and each system has a different wastewater flow rate. Dry air cleaning systems generate no process wastewater. In addition, the hot-forming manufacturing process produces steel in primary, section, flat, pipe, or tube; each product type generates a different wastewater flow rate. Ten of 25 non-integrated vacuum degassing systems and 30 of 73 non-integrated continuous casting systems reported discharge rates less than 10 gpt. EPA is using PNFs for non-integrated vacuum degassing systems and continuous casters of 10 gpt each. Forty-two of 94 non-integrated hot forming operations report flows less than or equal to 50 gpt. EPA is using a PNF of 50 gpt for non-integrated hot forming operations, which represents the best demonstrated flows for non-integrated hot forming operations operating at a 95% recycle rate. Many non-integrated sites report zero discharge of process wastewater using high-rate recycle systems for the entire mill and alternative disposal methods, although available data suggests that it would not be economically achievable for the entire subcategory, or even any definable sub-group of the existing facilities, to be able to achieve zero discharge of process wastewater.

6. Steel Finishing

a. *Wastewater Sources.* The proposed Steel Finishing Subcategory consists of two segments: Carbon and Alloy Steels and Stainless Steels. The Carbon and Alloy segment comprises acid pickling (typically with hydrochloric or sulfuric acids), cold forming, alkaline cleaning, hot coating, and electroplating operations. The Stainless segment includes salt bath and electrolytic sodium sulfate (ESS) descaling, acid pickling (typically with sulfuric, nitric, and nitric/hydrofluoric acids), cold forming, and alkaline cleaning. Salt bath descaling process wastewaters are generated from quenching and rinsing operations conducted after the steel is processed in the molten salt baths and from fume scrubbers. ESS descaling wastewaters result from spent baths, rinse waters, and fume scrubbers. Acid pickling process wastewaters include spent pickling acids, rinse waters, and pickling line fume scrubbers. Process wastewaters from cold rolling processes result from spent synthetic or animal-fat based rolling solutions and equipment cleaning. Continuous annealing wastewaters originate from associated alkaline cleaning operations. Alkaline cleaning process wastewaters include cleaning solution and rinse water blowdown. Wastewaters from hot coating operations result from product rinses, fume scrubbers, and cleaning operations. Wastewaters from electroplating operations result from acid and alkaline cleaning operations, plating solution losses, plating solution conditioning and treatment, and fume scrubbers. Tank clean-outs and equipment cleaning are other wastewater sources reported by a number of sites.

b. *Pollutants of Concern.* Based on its analysis of sampling data and industry-provided data from the Analytical and Production Survey, EPA determined that the principal pollutants from salt bath descaling in the stainless segment are TSS, cyanides, hexavalent and trivalent chromium, and nickel. The principal pollutants from acid pickling in both segments are TSS and metals, although for carbon steel operations, the principal metals are lead and zinc; and for stainless steel, chromium and nickel. The principal pollutants in cold rolling wastewaters are TSS, O&G measured as HEM, and metals (lead and zinc for carbon steels and chromium and nickel for stainless steels; chromium may also be a contaminant from cold rolling of carbon steels resulting from wear on chromium-plated work rolls). Toxic organic pollutants including naphthalene, other polynuclear aromatic compounds, and chlorinated solvents have been found in cold rolling wastewaters.

Because alkaline cleaning baths do not attack or dissolve the surface of the steel processed, the principal pollutants generated from alkaline cleaning operations are O&G removed from the steel. There is the potential for the presence of low levels of toxic organic pollutants found in cold rolling solutions. The principal hot coating pollutants are usually those associated with the coating metal or metal combinations and hexavalent chromium for lines with chromium brightening or passivation operations. Typical electroplating pollutants are TSS and O&G generated from the precleaning operations and the plated metals from plating solution losses, rinsing, and fume scrubbers.

In addition to these pollutants which EPA identified through its POC selection criteria process, EPA selected sulfate and total cyanide as POCs because these pollutants are present in sulfuric acid pickling wastewaters and reducing salt bath descaling wastewaters, respectively. (EPA did not sample these two wastewaters during the sampling program and therefore did not apply its POC selection criteria.)

EPA identified a total of 38 POCs for the carbon and alloy segment of the Steel Finishing Subcategory: 2 conventionals, 10 non-conventional metals, 7 non-conventional organics, 9 other non-conventionals, 2 priority organics, and 8 priority metals. EPA identified a total of 51 POCs for the stainless segment of the Steel Finishing Subcategory: 11 non-conventional metals, 17 non-conventional organics, 9 other non-conventionals, 4 priority organics, 9 priority metals, and one other priority pollutant (total cyanide).

c. *Wastewater Flow Rates.* EPA subdivided manufacturing operations by product type to capture differences in flow associated with different types of products and different metals coated. This approach should address product quality issues associated with water use. Although a number of mills engaging in certain finishing operations claim to need a relatively high PNF, information in today's record did not support a different PNF for the subcategory as a whole.

The acid pickling, other descaling, and alkaline cleaning operations are performed on various steel products such as sheet, strip, coil, bar, billet, rod, pipe, tube, and plate; and each product type generates a different wastewater flow rate. For cold forming, the manufacturing process could be conducted in either single or multiple mill stands, and the rolling solutions can be applied in a once-through, recirculated, or a combined manner; and the various application technique generates a different wastewater flow rate. For the electroplating process, either chrome/tin or other metals can be applied to sheet, strip, coil, and plate; and each product type generates a different wastewater flow rate.

No stand-alone salt bath descaling lines were found during the analysis of the iron and steel industry, and the industry did not report isolated flows for salt bath descaling lines that are co-located with combination acid pickling lines. Therefore, flow rates for salt bath descaling are included in the flow rates for combination acid pickling.

Wastewater discharge rates for acid pickling vary by product and steel type. Wastewater discharge rates for acid pickling vary by product and steel type, as well as acid used (in the case of carbon and alloy steels). For hydrochloric acid pickling of carbon and alloy steel, EPA is using a PNF of 50 gpt for sheet and strip (achieved by 18 of 47 lines), 490 gpt for bar, billet, rod, and coil, and 1020 gpt for pipe and tube. For sulfuric acid pickling of carbon and alloy steel, EPA is using a PNF of 230 gpt for strip and sheet (achieved by five of nine lines), 280 gpt for bar, billet, rod, and coil, and 500 gpt for pipe and tube. For acid pickling of stainless steel, EPA is using a PNF of 230 gpt for bar and billet (representing the median flow rate), 700 gpt for sheet and strip (achieved by 19 of 50 lines), and 35 gpt for plate (representing the median flow rate). For all pickling operations with fume scrubbers, EPA is using a normalized flow rate of 15 gallons per minute (gpm). The PNFs for hydrochloric and sulfuric acid pickling for bar, billet, rod, and coil and pipe and tube are retained from the 1982 Iron and Steel regulation. The Agency obtained current PNFs for the other four pickling operations. EPA is using a PNF of 100 gpm for acid regeneration.

Wastewater discharge rates for cold forming vary by the number of mill stands, steel type, and whether rolling solutions are recirculated. EPA is using the following PNFs: single stand, direct application—3 gpt; single stand, recirculation—1 gpt; multi-stand, direct application—275 gpt; multi-stand, recirculation—25 gpt; multi-stand, combination—143 gpt. EPA is using a PNF for the alkaline cleaning sections of continuous annealing lines of 20 gpt (achieved by seven of 16 stand alone annealing lines). Wastewater discharge rates for alkaline cleaning vary by product and steel type. For carbon and alloy steel, EPA is using a PNF of 350 gpt for sheet and strip and 20 gpt for pipe and tube. EPA is using a PNF of 2,500 gpt for stainless sheet and strip. EPA is using a PNF of 550 gpt for hot dip coating operations. With the exception of continuous annealing, each of these represents the median of PNFs observed.

Discharge rates for electroplating vary by the type of metal applied. EPA is using a PNF of 1,100 gpt for tin and chromium sheet and strip lines; 550 gpt for other sheet and strip lines. EPA is using a PNF of 35 gpt for electroplating of steel plate. Each of these represents the median of PNFs observed. For all electroplating operations with fume scrubbers, EPA is using a normalized flow rate of 15 gpm.

7. Other Operations

a. *Wastewater Sources.* The subcategory EPA proposes for other operations encompasses segments for direct-reduced ironmaking, forging, and briquetting. Wet air pollution control systems are the primary process wastewater source for DRI operations. Contact water comprises the majority of the process wastewater from forging operations. Some sites identified equipment cleaning as another source of wastewater from forging operations. Briquetting operations use dry air pollution controls and do not generate process wastewater.

b. *Pollutants of Concern.* EPA has only limited sampling and industry-provided data from the Analytical and Production Survey for forging, briquetting, and DRI operations. EPA solicits comments and additional data for these operations.

Based on all available data, EPA found that the principal pollutant parameter from DRI facilities is TSS. For forging, the principal pollutants are TSS, O&G measured as HEM, and metals. All briquetting operations are dry.

Using the POC selection criteria presented above, EPA identified 8 POCs for the Other Operations Subcategory: 1 conventional, 4 non-conventional metals, and 3 other non-conventionals.

c. *Wastewater Flow Rates.* The Agency found forging operations to be similar to other hot forming operations, and therefore used a 96% recycle rate, as demonstrated for other hot forming operations, as the basis for PNF determination, giving a PNF for forging operations of 100 gpt. EPA is using a PNF for DRI operations of 90 gpt, which was demonstrated by two of three DRI plants engaged in high rate recycling of their scrubber wastewater.

V. Technology Options, Costs, and Pollutant Reductions

A. Introduction

This section describes the technology options and associated costs and pollutant reductions that EPA evaluated in developing the effluent limitations guidelines and standards proposed today for the seven subcategories. To determine the technology basis and performance level for the proposed regulations, EPA developed a database consisting of daily effluent data collected from the Analytical and Production Survey and the EPA wastewater sampling program. EPA used this database to support the BPT, BAT, NSPS, PSES, and PSNS effluent limitations guidelines and standards proposed today. While EPA has proposed effluent limitations guidelines and standards based on a combination of processes and treatment technologies, EPA is not proposing to require a discharger to use those processes or technologies in treating the wastewater. Rather, the processes and technologies used to treat iron and steel wastewaters are left to the discretion of each facility; EPA would require only that the numerical discharge limits are achieved.

In order to establish the proposed limits, EPA reviewed data from treatment systems in operation at a number of iron and steel facilities and used the data to calculate concentration limits that are achievable based on a well-operated system using the proposed model processes and wastewater treatment technologies. In Section C below, EPA presents a summary of the technology options EPA considered for the proposed effluent limitations guidelines and standards in each subcategory.

1. Focused Rulemaking Approach

EPA is developing this regulation using a focused rulemaking approach, which involves conducting several aspects of data gathering and analysis activities in parallel and assessing only a limited number of regulatory options. This is unlike the traditional approach where EPA conducts these efforts in a serial manner and considers a wider range of regulatory options. The focused rulemaking approach is feasible for the iron and steel regulation because the Agency has acquired a good understanding of the industry, its associated pollutants, and the available control and treatment technologies from its prior rulemaking efforts. Furthermore, EPA also adopted the focused approach for the iron and steel regulation in order to meet a court-ordered schedule (see Section II.B). In general, the focused approach allows EPA to have a more focused data gathering process and reduces the time spent investigating marginal regulatory options. EPA then evaluates each option it identifies in accordance with the statutory factors, *e.g.,* the removal efficiencies and economic achievability of various model treatment technologies.

A successfully implemented focused rulemaking process involves a combination of early analysis of available information, focused data collection effort, and extensive stakeholder involvement. A key component of the data gathering process was using a questionnaire distributed under authority of section 308 of the Clean Water Act. See Section IV.D. EPA worked with stakeholders in developing this questionnaire, which was approved by the Office of Management and Budget. For the iron and steel rulemaking, EPA utilized its 1997 questionnaire results from individual facilities, in conjunction with EPA's field sampling data, to assess the wastewater characteristics and the effectiveness of various pollution control and treatment technologies for the industry. In addition, EPA also supplemented the database with information voluntarily submitted by industry, permitting and pretreatment authorities, and vendors. Furthermore, by involving the stakeholders early in the rulemaking, the Agency also developed a good understanding of the experience that the industry has gained from pollution control technologies implemented since the 1980's, when the current rule was promulgated.

In addition to early information gathering and analysis, extensive stakeholder involvement is also an important element of the focused rulemaking process. EPA met with the industry, environmental groups and other stakeholders at various stages of the rulemaking process to discuss the preferred options and identify issues of concern. For instance, between December 1998 and January 2000, EPA sponsored five stakeholder meetings to present the technology bases for the Agency's preliminary options and to solicit comments and ideas from the stakeholders. Section IV.D.5 contains additional information regarding the various stakeholder meetings. EPA also expects to gather additional information through the public comment process.

As the result of this focused process, the Agency is proposing a streamlined group of seven subcategories that will be used as the framework for revising the existing effluent limitations guidelines and standards. Section IV.E explains the basis for the proposed subcategorization. Section V.C and IX contain detailed information on technology options that were considered and the selected technologies, respectively.

During the public comment period on today's proposed rule, EPA plans to continue its data gathering and analysis efforts for support of the final rule. EPA may publish in the **Federal Register** a subsequent notice of data availability for data and information that the Agency may use to support the final rule. Such data may be generated by EPA or submitted by stakeholders in response to this proposal.

EPA encourages full public participation in developing the final Iron and Steel Effluent Limitations Guidelines and Standards. EPA welcomes comment on all options and issues and encourages commenters to submit additional data during the comment period. EPA also is willing to talk with interested parties during the comment period to ensure that EPA considers the views of all stakeholders and the best possible data upon which to base a decision for the final regulation. EPA will conduct a public hearing during the public comment period.

2. Available Technologies

The treatment technologies used by the iron and steel industry consist of in-process treatment and reuse of process solutions and process waters, and end-of-pipe physical-chemical and biological treatment.

The in-process, physical-chemical, and biological treatment technologies in use at Iron and Steel facilities include:

- *Acid purification:* An in-process resin technology applied to spent acid baths to adsorb acid and allow contaminants to pass into a waste stream. The process produces an acid which is reused for acid pickling.
- *Acid Regeneration:* Thermal decomposition of spent pickle liquor, which contains free hydrochloric acid, ferrous chloride, and water.
- *Alkaline Chlorination:* Chemical addition of chlorine in a two-stage, pH-adjusted system to oxidize cyanide, ammonia, phenols, and other organic compounds.
- *Biological Treatment:* There are several forms of biological treatment. For the purpose of this regulation, biological treatment refers to an activated sludge system with nitrification; a continuous flow, aerobic treatment process which employs suspended-growth aerobic microorganisms to biodegrade organic contaminants and oxidize ammonia to nitrate. A portion of the biomass is collected and returned to the activated sludge system.
- *Clarification:* Usually a circular, cone-bottom steel or concrete tank with a center stilling well and mechanical equipment at the bottom for settling and subsequent removal of suspended solids from the wastewater stream.
- *Classification:* Any device, such as a dragout tank or screw classifier, used to aggregate and remove large suspended solids from wastewater.
- *Coagulation/flocculation:* Coagulation/flocculation causes small suspended solids such as precipitated metal hydroxides and biological mixed liquor solids to aggregate into larger particles with a density greater than water. The particles are then separated from the wastewater by gravity settling.
- *Cooling Tower:* Direct cooling through evaporative heat transfer to lower the temperature of non-contact cooling water or process water prior to further treatment or recycle.
- *Countercurrent Rinses:* The use of a series of rinse tanks to minimize the amount of water used to clean the surface of steel products. Rinse water overflows from one tank to another in a direction opposite the flow of steel product.
- *Cyanide Precipitation:* Cyanide precipitation combines free cyanide with iron to form an insoluble iron-cyanide complex that can be precipitated and removed by gravity settling.
- *Diversion Tank:* Tank used to handle hydraulic or waste loading surges in cases of emergency overflow.
- *Emulsion Breaking:* Addition of de-emulsifying agents such as heat, acid, metal coagulants, polymers, and clays to oily wastewaters to break down emulsions and produce a mixture of water and free oil and/or an oily floc.
- *Equalization:* Equalization through proper retention and mixing in a tank dampens variation in hydraulic and pollutant loadings, thereby reducing shock loads and increasing treatment facility performance.
- *Free and Fixed Ammonia Still:* Ammonia distillation is the transfer of gas (ammonia) dissolved in a liquid (coke plant excess flushing liquor) into a gas stream (steam). In the coke industry, flushing liquor is pumped to the top of a tray-type distillation tower while steam is injected into the base. As the rising steam passes through the boiling flushing liquor moving down the tray tower, ammonia is transferred from the liquid to the gas phase, eventually passing out the top of the tower. A "free" still operates with steam only, with no alkali addition, to remove ammonia and acid gases (hydrogen cyanide, hydrogen sulfide). A "fixed" still is similar to a "free" still except lime or sodium hydroxide is added to the liquor to convert the water soluble ammonium ion to ammonia which can be removed as a gas.
- *Granular Activated Carbon :* The use of granular activated carbon to remove dissolved organic compounds from wastewater. When the attractive forces at the carbon surface overcome the attractive forces of the liquid, organic pollutants adsorb to the carbon particle surface. Pollutants in the water phase will continue to bond to the activated carbon until all surface bonding sites are occupied. When all bonding sites are occupied, the carbon is considered to be "spent" and is either disposed or regenerated.

- *Heat Exchanger:* Device which allows indirect cooling through the use of noncontact cooling water to lower the temperature of wastewater prior to biological treatment.
- *Hexavalent Chromium Reduction:* The use of a reducing agent to convert hexavalent chromium to trivalent chromium.
- *High-Rate Recycle:* A system of pumps and piping which return treated and temperature adjusted process water back to a steel manufacturing process or air pollution control unit. For purposes of this proposed rule, high-rate recycle means recycle of the circulating flow at 95 percent or higher.
- *Metals Precipitation:* The removal of metal contaminants from aqueous solutions by converting soluble, metal ions to insoluble metal hydroxides. The precipitated solids are then removed from solution by coagulation/flocculation (see definition above) followed by clarification and/or filtration. Precipitation is caused by the addition of chemical reagents such as sodium hydroxide, lime or magnesium hydroxide to adjust the pH of the water to the minimum solubility of the metal.
- *Mixed-media Filtration:* Mixed-media filtration involves a fixed (gravity or pressure) or moving bed of porous media that traps and removes suspended solids from water passing through the media.
- *Oil/water Separation:* Oil/water separators are usually long rectangular tanks in which free oil floats to the surface, where it can be skimmed off. Often inclined parallel plates are added to serve as collecting surfaces for oil globules. Oil/water separation is typically preceded by emulsion breaking (see definition above).
- *pH Control:* The use of chemical addition and mixing to adjust the pH of wastewater to a desired pH level, usually in the range of 8.5 to 9.0 for effective metals precipitation.
- *Roughing Clarifiers:* High surface loading clarifiers designed to remove settleable solids from wastewater prior to filtration or other treatment.
- *Scale Pit:* An in-ground basin constructed of concrete for recovery of scale from process wastewaters used in hot forming and continuous casting operations.
- *Sludge Dewatering:* Gravity thickening is first accomplished in a tank equipped with a slowly rotating rake mechanism which breaks the bridge between sludge particles, thereby increasing settling and compaction. A sludge dewatering device such as a belt pressure filter, plate-and-frame pressure filter, or vacuum filter is then used to mechanically remove excess water from the sludge.
- *Tar/oil Removal:* Tar and oils are recovered from coke plant flushing liquor by gravity separation in a flushing liquor decanter and subsequent tar separation devices including storage tanks or filtration systems.

B. Methodology for Estimating Costs and Pollutant Reductions Achieved by Model Treatment Technologies

EPA estimated industry-wide compliance costs and pollutant reductions associated with today's proposed rule from data collected through survey responses, site visits, sampling episodes, data collected from state agencies, comments submitted during the stakeholder process, and computerized cost and pollutant loadings models developed for each of the technology options considered. EPA calculated facility specific compliance costs and pollutant reductions for facilities in the Cokemaking, Ironmaking, Steelmaking, and Integrated and Stand Alone Hot Forming Subcategories. For all other subcategories, EPA used statistically calculated survey weights to develop national estimates of these results.

EPA evaluated wastewater treatment technology performance for each survey respondent using effluent data provided in the Detailed and Short Form Surveys, effluent data collected from state agencies for sites that have made significant wastewater treatment modifications since 1997, and effluent data collected during Agency site visits and sampling episodes conducted from 1996 to 1999. EPA assumed that facilities whose current pollutant loadings exceeded the pollutant loadings associated with each technology option would incur costs as a result of compliance with that option. To determine the wastewater treatment upgrades or modifications necessary for each facility to achieve compliance, the Agency performed an analysis of wastewater treatment technology in place using data provided in the Detailed and Short Form Surveys and information collected during Agency site visits and sampling episodes conducted from 1996 through 1999. Based on this evaluation, EPA developed a computerized design and cost model to estimate the following capital costs and one-time consulting fees for each technology option under consideration.

- Major equipment: purchased equipment costs, including freight.
- Installation: mechanical equipment installation, piping installation, civil/structural (site preparation/grading, foundations, etc.), and electrical and process control.
- Indirect costs: costs for temporary facilities, spare parts, engineering procurement and contract management and other costs.
- Contingency: additional costs included in estimate to account for unforeseen items in vendor and/or contractor estimates.
- Consultant costs: single-occurrence costs associated with hiring an outside consultant to upgrade wastewater treatment system performance (*e.g.,* improve operating and maintenance to optimize biological treatment system performance).

EPA developed major equipment costs using data from the Cost Survey and vendor quotes. An engineering and design firm that has performed wastewater treatment installations for the iron and steel industry estimated indirect costs, installation, and contingency. Based on Cost Survey data and the estimates provided by the engineering and design firm, the Agency estimated installation costs separately for each technology option; indirect costs were assumed to be 28% of total direct costs; contingency costs were assumed to be 20% of total direct and indirect costs. EPA used engineering judgment to estimate consultant costs, based on its review of consultant costs.

The Agency also designed the cost model to estimate incremental operating and maintenance costs associated with the following cost items:

- Labor (operating and maintenance)
- Maintenance (materials and vendors)
- Chemical costs
- Energy costs
- Steam costs
- Sludge/residuals (hazardous/nonhazardous) disposal costs
- Oil disposal costs
- Sampling/monitoring costs

EPA developed incremental operating and maintenance costs using data provided in the Detailed and Short Form Surveys, Perry's Chemical Engineers Handbook—Sixth Edition, U.S. Department of Energy—Average Industrial Electrical Costs in 1998, the 1998 Bureau of Labor Statistics, and the 1997 Chemical Market Reporter.

EPA evaluated the hydraulic capacity of the process water treatment and recycle systems. Where the system was found to be capable of recirculating the incremental flow necessary to achieve the model BAT discharge flow, EPA assigned no investment cost for new equipment in the main treatment and recycle circuit. In most instances, the increase in recycle rate was only a few percent of the total recirculating flow rate. For these cases, EPA assigned a one-time cost of $50,000 for consultant and mill services to conduct an evaluation of the treatment and recycle system and to modify water management practices and operations to achieve the model BAT discharge flow rate.

For those mills described above where one-time costs were assigned to achieve the model BAT discharge flow rate for the main process water treatment and recirculation circuit, incremental operation and maintenance costs were not assigned. The Agency assumed the increased costs associated with modifying the recycle rate (power costs) would be minimal and offset by likely savings in recirculating process water chemical treatment.

EPA requests that interested stakeholders comment on this costing approach and offer suggestions for improvements.

To determine the pollutant loading reduction associated with process and treatment upgrades, EPA estimated the baseline load and the post-compliance load expected from sites after treatment improvements and process changes associated with each technology option. The post-compliance reduction in pollutant mass is attributable to both improved treatment and process changes, most notably high-rate recycle for several subcategories. Improved treatment resulted in lower concentrations for some pollutants. EPA estimated that sites with high-rate recycle have a lower discharge flow and a subsequent lower pollutant mass discharged. EPA calculated the pollutant loading reduction as the difference between the estimated baseline load and the post-compliance load for each technology option. All pounds reported below are annual estimates.

EPA compared production normalized flows, as described in Section IV.F, with the facilities' actual process wastewater flow rates to determine what level of additional treatment facilities would have to add to achieve the level of pollution control described in the technology options (*e.g.,* through reducing flow rates). This was especially important when a component of the technology option was high rate recycle. In this way a facility's flow rate had a direct impact on both the expected cost to the facility and on the pollutant removal EPA estimated for the facility.

Information on EPA's compliance cost and pollutant loading estimates and methodologies, including the cost curves for all treatment technologies considered as the basis for today's proposed rule, is located in the public record. Some of the information EPA used to estimate compliance costs and pollutant loadings was claimed by survey recipients as CBI. This information is not in the public record. However, EPA provides in the public record a number of publicly available documents that set forth its methodology, assumptions and rationale for developing its cost estimates and that also present as much data as possible through the use of aggregations, summaries and other techniques to mask CBI. EPA encourages all interested parties to refer to the record and to provide comment on any aspect of the methodology or the data used to estimate compliance costs associated with today's proposal.

C. Technology Options, Regulatory Costs, and Pollutant Reductions

The Agency estimated the costs and pollutant loading reductions associated with iron and steel facilities to achieve compliance for each proposed technology option under consideration. This section summarizes the proposed technology options under consideration and the estimated costs and pollutant reductions associated with each option, by subcategory. For each option the capital cost, operating and maintenance costs, and other one-time costs are presented. See Section VI for a listing of total annualized costs by subcategory. All cost estimates in this section are expressed in terms of pre-tax 1997 dollars. Note that BPT technology options are discussed where applicable.

1. Cokemaking

a. *By-product cokemaking.* For the by-product cokemaking segment of this subcategory, EPA considered several different BAT, PSES, NSPS, and PSNS technologies.

EPA estimates that by-product cokemaking sites currently discharge approximately 2.3 million pounds of conventional pollutants (BOD, TSS, and O&G) directly. By-product cokemaking operations discharge approximately 2.7 million pounds of total priority and non-conventional pollutants directly and approximately 550,000 pounds indirectly.

Table V.C.1–1 presents the various options considered for by-product cokemaking, Table V.C.1–2 presents the associated costs, and Table V.C.1–3 presents the associated pollutant reduction estimates.

TABLE V.C.1.–1.—PROPOSED BY-PRODUCT COKEMAKING BAT/PSES TECHNOLOGY OPTIONS

Technology units	Treatment options							
	BAT–1	BAT–2	BAT–3	BAT–4	PSES–1	PSES–2	PSES–3	PSES–4
Tar/oil removal	X	X	X	X	X	X	X	X
Equalization/still feed tank	X	X	X	X	X	X	X	X
Free and fixed ammonia still	X	X	X	X	X	X	X	X
Heat exchanger	X	X	X	X	....	....	X	X
Cyanide precipitation	....	X	....	....	....	X	....	....
Equalization tank	X	X	X	X	....	....	X	X
Biological treatment with secondary clarification	X	X	X	X	....	....	X	X
Sludge dewatering	X	X	X	X	....	X	X	X
Alkaline chlorination	....	....	X	X	....	....	....	X
Mixed-media filtration	....	....	....	X	....	X	....	....
Granular activated carbon	....	....	....	X	....	....	....	....

TABLE V.C.1–2.—COST OF IMPLEMENTATION FOR COKEMAKING

[In millions of pre-tax 1997 dollars]

	Treatment options							
	BAT–1	BAT–2	BAT–3	BAT–4	PSES–1	PSES–2	PSES–3	PSES–4
Number of mills	14	....	....	....	8	....	....	....
Capital costs	8.0	12.4	42.3	66.5	0	6.0	18.6	32.1
Annual O&M costs	0.1	3.0	7.2	14.9	0.3	1.8	3.3	5.8
One-time costs	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2

TABLE V.C.1–3.—ESTIMATED POLLUTANT LOADING REDUCTION FOR COKEMAKING

[In million pounds/year]

	Treatment options							
	BAT–1	BAT–2	BAT–3	BAT–4	PSES–1	PSES–2	PSES–3	PSES–4
Incidental Removal of Conventional Pollutants (BOD, TSS, and O&G)	0.21	0.21	0.21	0.68	....	....	....	....
Removal of Priority and Non-conventional Pollutants	0.39	0.39	0.43	0.43	0.18	0.18	0.54	0.54

i. BAT

The technology option identified as BAT–1 consists of the same technologies and processes comprising the current BAT for by-product cokemaking, but with significant improvements in design and operation. Each of the other BAT options builds on this foundation. Under the first BAT option, water usage can be reduced by 1.6 million gallons per year from current levels and the rate of removing non-conventional pollutants can increase by 14% over those levels. The second BAT option results in no further reduction in flow beyond BAT–1 levels, but does result in the additional removal of 24% of the total cyanide from direct discharging cokemaking wastestreams through the use of cyanide precipitation. The third BAT option also results in no further reduction in flow beyond BAT–1 levels, but does result in the additional removal of 29% of the total cyanide (as well as additional removal of other pollutants) from direct discharging cokemaking wastestreams beyond BAT–1 levels through the use of alkaline chlorination. The fourth BAT option, which was included in the analysis as a potential means to achieve significant pollutant reduction, results in no further reduction in flow beyond that to be achieved by any of the BAT options, and does not lead to significant additional pollutant removal beyond that to be achieved by BAT–3.

EPA performed a preliminary assessment of including non-recovery cokemaking as a technology option for this segment. While this technology would result in a zero discharge of process wastewater and would reduce air emissions, the Agency did not consider it as an option for this segment for the following reasons:

—Non-recovery cokemaking has not reliably demonstrated the ability to produce foundry coke. Therefore, it is not an available technology for the segment as a whole.

—Non-recovery cokemaking processes preclude the production of coal by-products. Therefore, it is not an available technology for facilities in this segment that produce these by-products.

—Choosing non-recovery cokemaking processes as BAT to the exclusion of by-product processes would have significant adverse secondary economic effects on coal by-products markets and consuming industries. For example, the domestic coal tar refining industry, which consists of 5 companies with 13 facilities in 10 states as of 1997, is dependent upon the coke by-product production of crude coal tar as a feedstock.

—The estimated capital cost of replacing current cokemaking capacity with non-recovery coke plants is at least $3 billion. The estimate does not include full scale heat recovery for power generation and flue gas scrubbing. The estimated additional capital cost for heat recovery co-generation is at least $2.5 billion.

—The estimated operating costs are uncertain. The recently constructed non-recovery coke plant with associated heat recovery was the final coke plant to qualify for a federal alternative energy tax credit, which expired in June 1998. The presence of this tax credit clouds comparisons of operating costs between traditional by-product cokemaking and non-recovery cokemaking. Further, it is uncertain whether heat recovery co-generation is a necessary component of non-recovery cokemaking in the comparison of relative operating costs of by-product and non-recovery cokemaking.

—The economic viability of non-recovery cokemaking is impacted by site-specific factors, including land availability and local energy markets. For example, the local cost of electricity is a key determinant of the economic viability of heat recovery co-generation. Economic viability also depends on the presence of a large industrial energy user that would purchase electrical power and/or steam from co-generation. In cases where steel production and coke production are co-located, this condition is met; however, a number of existing coke plants are not co-located with steel production.

ii. PSES

Table V.C.1–1 shows the technical bases for the PSES options EPA examined. Except as noted, the technology basis for PSES–1 consists of the same technologies and processes comprising the current PSES for cokemaking with significant improvements in design and operation. This technology option would control the pollutants EPA has determined pass through. See Section IX. Unlike the current PSES model technology, however, PSES–1 does not include a dephenolizer. EPA collected information through its sampling program and technical surveys that shows that a dephenolizer is unnecessary to control the pollutants that EPA has determined pass through.

The technology basis for PSES–2 consists of PSES–1 plus cyanide precipitation, sludge dewatering, and mixed-media filtration. The technology basis for PSES–3 is identical to BAT–1. The technology basis for PSES–4 is identical to BAT–3.

The technology options for BAT and PSES are different because they are designed to control different parameters, based on EPA's pass-through analysis (see Section IX.A.2). For a discussion of the different technologies, refer to Section V.A.3.

Under PSES–1, water use can be reduced by 30% over the current levels, and the rate of removal of ammonia can increase by 62% over current levels. Under PSES–2, water use can be decreased by an additional 3.5% over that expected under PSES–1, and removal of cyanide can increase by 45% over that expected under PSES–1. Under PSES–3, the removal of ammonia can increase by 95% over that expected under PSES–2. Under PSES–4, there are virtually no additional removals.

iii. NSPS/PSNS

The technology options EPA considered for new sources are identical to those it considered for existing dischargers because no other treatment technologies are demonstrated. The Agency, however, did perform a preliminary assessment of non-recovery cokemaking as a technology option for NSPS for the by-product cokemaking segment but did not consider it as an option for the reasons discussed in the BAT section (Section V.C.1.a.i). Therefore, all technology options presented as BAT or PSES options also describe NSPS and PSNS options.

b. *Non-recovery cokemaking.* For the non-recovery cokemaking segment of this subcategory, EPA considered only one BPT, BAT, PSES, NSPS and PSNS technology option, i.e., the technology in place at the two sites currently using the non-recovery method for cokemaking. For a discussion of this technology, see Section 4 of the technical development document. The non-recovery cokemaking process results in zero discharge because the non-recovery cokemaking process does not generate process wastewater.

2. Ironmaking

This proposed subcategory encompasses two segments: sintering and blast furnace operations. The subcategory is segmented to take into account differences in the model treatment system flow rates used to develop the proposed effluent limitations guidelines and standards. However, EPA considered the same technologies for both segments (with the exception of cooling towers, which are not used for sinter operations). EPA did so because, where co-located, the wastewaters from both these processes are generally co-treated. BAT and PSES technologies would apply to either separate or combined treatment of wastewater from sintering and blast furnace operations. Technology options, costs, and pollutant loading reduction estimates for these two segments are presented on a combined basis below because of co-treatability of the wastewaters.

EPA estimated that Ironmaking operations discharge approximately 2.4 million pounds of conventional pollutants (TSS and O&G) directly. Ironmaking operations directly discharge approximately 5 million pounds of total priority and non-conventional pollutants. The Agency does not present results for indirect dischargers, because there is only one indirect discharger in this proposed subcategory and data aggregation or other masking techniques are insufficient to avoid disclosure of information claimed as confidential business information.

Table V.C.2–1 presents the options considered, Table V.C.2–2 presents the associated costs, and Table V.C.2–3 presents the associated pollutant reduction estimates.

a. Blast Furnaces. Some blast furnace operations achieve zero discharge by evaporating wastewater on slag. EPA does not advocate the practice of slag quenching with blast furnace wastewater because runoff from the process can lead to documented ground water contamination; therefore, the various treatment options do not include slag quenching. The Agency considered sites performing slag quenching to be zero discharge sites in the cost and pollutant reduction estimates because that practice, however undesirable, would allow them to achieve compliance with today's proposed effluent limitations guidelines and standards for the blast furnace segment.

b. Sintering. The source of pollutants in sinter wastewater is from the sinter plant's air pollution control system. Of the eight sinter plants operating in 1997, three have achieved zero discharge by using baghouses in place of wet air pollution control. The other five sinter plants generate wastewater as a result of wet air pollution control and therefore have installed treatment systems for that wastewater. The various components of typical treatment systems are identified in Table V.C.2–1. EPA considered whether to explore baghouses as a technology option, in place of wet air pollution controls, in an effort to achieve zero discharge. EPA concluded that the use of baghouses would not be a viable option because of significant retrofit costs and the potential for adverse non-water quality environmental impacts, which are discussed in detail in the iron and steel technical development document.

i. BAT

The technology option identified as BAT–1 consists of the same technologies and processes comprising the current BAT for ironmaking, but with significant improvements in design and operation. EPA intended to evaluate a second BAT option, building on this foundation by including granular activated carbon to the blowdown treatment. However, EPA did not pursue the option because all significant POCs in the effluent after application of BAT–1 system are projected to exist at levels too low to be further treated by this or any other add-on technology.

TABLE V.C.2–1.—IRONMAKING TECHNOLOGY OPTIONS

Treatment units	Technology options	
	BAT–1	PSES–1
Solids removal	X	X
Sludge dewatering	X	X
Cooling tower[1]	X	X
High-rate recycle	X	X
Blowdown treatment		
Metals precipitation	X	X
Alkaline chlorination	X	

TABLE V.C.2–1.—IRONMAKING TECHNOLOGY OPTIONS—Continued

Treatment units	Technology options	
	BAT–1	PSES–1
Mixed-media filtration	X	

[1] Applies to blast furnace process wastewater only

TABLE V.C.2–2.—COST OF IMPLEMENTING FOR IRONMAKING

[In millions of pre-tax 1997 dollars]

	Technology options (BAT–1 and PSES–1)
Number of mills	15
Capital costs	25.8
Annual O&M costs	2.7
One-time costs	0.7

Data aggregated to protect confidential business information.

TABLE V.C.2–3.—ESTIMATED POLLUTANT LOADING REDUCTION FOR IRONMAKING

[In million pounds/year]

	Technology options (BAT–1 and PSES–1)
Incidental Removal of Conventional Pollutants (TSS and O&G)	2.3
Removal of Priority and Non-Conventional Pollutants	3.5

Data aggregated to protect confidential business information.

Under BAT–1, water usage can be reduced by 5% from current levels, and total loadings of toxic and non-conventional pollutants can be reduced by 68%.

ii. PSES

The technology option identified as PSES–1 consists of the same technologies and processes comprising the current PSES for ironmaking, but with significant improvements in design and operation. This technology option would control the pollutants EPA has determined pass through. See Section IX. Unlike the current PSES model technology or BAT–1, however, PSES–1 does not include alkaline chlorination or mixed-media filtration. Data from EPA's iron and steel sampling program and survey responses indicated that alkaline chlorination and mixed-media filtration are unnecessary to control the pollutants that EPA has determined pass through.

iii. NSPS/PSNS

The technology options EPA considered for new sources are identical to those it considered for existing dischargers because no other treatment technologies are demonstrated. Therefore, all technology options presented in Table V.C.2–1 as BAT or PSES options also describe NSPS and PSNS options.

3. Integrated Steelmaking

EPA is not proposing to further segment this subcategory. EPA considered BAT and PSES technologies for treatment of wastewater for this subcategory. EPA estimates that integrated steelmaking operations directly discharge approximately 2.5 million pounds of conventional pollutants (TSS and (O&G) and approximately 6.2 million pounds of total priority and non-conventional pollutants. The Agency does not present results for indirect dischargers, because there is only one indirect discharger in this proposed subcategory and data aggregation or other masking techniques are insufficient to avoid disclosure of information claimed as confidential business information.

Table V.C.3–1 presents the options considered for integrated steelmaking, Table V.C.3–2 presents the associated costs, and Table V.C.3–3 presents the associated pollutant reduction estimates.

TABLE V.C.3–1.—INTEGRATED STEELMAKING TECHNOLOGY OPTIONS

Treatment units	Technology options	
	BAT–1	PSES–1
Solids removal with classifier and clarifier	X	X
Sludge dewatering	X	X
Cooling tower[1]	X	X
High-rate recycle	X	X
Blowdown treatment		
Metals precipitation	X	X

[1] Cooling tower is part of the treatment system where necessary and was costed accordingly.

TABLE V.C.3–2.—COST OF IMPLEMENTATION FOR INTEGRATED STEELMAKING

[In millions of pre-tax 1997 dollars]

	Technology options (BAT–1 and PSES–1)
Number of mills	21
Capital costs	16.8
Annual O&M costs	2.9
One-time costs	2.1

Data aggregated to protect confidential business information.

TABLE V.C.2–3.—ESTIMATED POLLUTANT LOADING REDUCTION FOR STEELMAKING

[In million pounds/year]

	Technology options (BAT-land PSES–1)
Incidental Removal of Conventional Pollutants (TSS and O&G)	19
Removal of Priority and Non-Conventional Pollutants	4.1

Data aggregated to protect confidential business information.

a. *BAT.* The technology option identified as BAT–1 consists of the same technologies and processes comprising the current BAT for steelmaking, but with significant improvements in design and operation. EPA intended to evaluate a second BAT option, building on this foundation by including mixed-media filtration to the blowdown treatment. However, EPA did not pursue the option because all significant POCs in the effluent after application of BAT–1 system are projected to exist at levels too low to be further treated by this or any other add-on technology.

Under the BAT–1, water usage can be reduced by 83% over current levels, and total loadings of toxic and non-conventional pollutants can be reduced by 66%. b.

b. *PSES.* The technology option identified as PSES–1 consists of the same technologies and processes comprising the current PSES for steelmaking (which is also the same technical basis as BAT–1), but with improvements to design and performance. This technology option would control the pollutants EPA determined pass through. See Section IX.

c. *NSPS/PSES.* The technology options EPA considered for new sources are identical to those it considered for existing dischargers because no other treatment technologies are demonstrated. Therefore, all technology options presented in Table V.C.3–1 as BAT or PSES options also describe NSPS and PSNS options.

4. Integrated and Stand Alone Hot Forming

EPA proposes dividing this subcategory into two segments: carbon and alloy steels, and stainless steels. See Section IV.E above. The treatment options for the two segments are identical. For this proposed subcategory, EPA considered BAT and PSES technologies for treatment of wastewater from hot forming operations located at integrated and stand-alone facilities.

Table V.C.4.–1 presents the options considered for integrated and stand-alone hot forming, Table V.C.4–2 presents the associated costs, and Table V.C.4–3 presents the associated pollutant reduction estimates.

TABLE V.C.4–1.—INTEGRATED AND STAND-ALONE HOT FORMING TECHNOLOGY OPTIONS

Treatment units	Technology options	
	BAT–1	PSES–1
Carbon and Alloy Steels		
Scale pit with oil skimming	X	X
Roughing clarifier with oil removal	X	X
Sludge dewatering	X	X
Mixed-media filtration [1]	X	X
High-rate recycle	X	X
Blowdown treatment	....	....
Mixed-media filtration [1]	X	X
Stainless Steels		
Scale pit with oil skimming	X	X
Roughing clarifier with oil removal	X	X
Sludge dewatering	X	X
Mixed-media filtration [1]	X	X
High-rate recycle	X	X
Blowdown treatment		
Mixed-media filtration [1]	X	X

[1] Mixed-media filtration of recycled flow or low-volume blowdown flow.

TABLE V.C.4–2.—COST OF IMPLEMENTATION FOR INTEGRATED AND STAND-ALONE HOT FORMING

[In millions of pre-tax 1997 dollars]

	Technology options	
	BAT–1	PSES–1
Carbon and Alloy Steels		
Number of mills	44	7
Capital costs	115.3	0.3
Annual O&M costs	16.1	0.1
Stainless Steels		
Number of mills	0	3
Capital costs	0	1.1
Annual O&M costs	0	0.2
One-time costs	0	0.1

TABLE V.C.4–3.—ESTIMATED POLLUTANT LOADING REDUCTION FOR INTEGRATED AND STAND-ALONE HOT FORMING

[In million pounds/year]

	Technology options	
	BAT–1	PSES–1
Carbon and Alloy Steels		
Incidental Removal of Conventional Pollutants (TSS and 22— O&G)	22	-
Removal of Priority and Non-Conventional Pollutants	5.2	0.02

TABLE V.C.4–3.—ESTIMATED POLLUTANT LOADING REDUCTION FOR INTEGRATED AND STAND-ALONE HOT FORMING—Continued

[In million pounds/year]

	Technology options	
	BAT–1	PSES–1
Stainless Steels		
Incidental Removal of Conventional Pollutants (TSS and 01— O&G)	[1] 0	-
Removal of Priority and Non-Conventional Pollutants	[1] 01	0.001

[1] No direct discharging stainless facilities exist in this subcategory.

a. *Carbon and Alloy Steels*. EPA estimates that carbon and alloy steel hot forming operations sites directly discharge approximately 26 million pounds of conventional pollutants (TSS and O&G). These operations also discharge directly approximately 12 million pounds of total priority and non-conventional pollutants and approximately 0.038 million pounds indirectly.

i. BAT

Currently, effluent limitations guidelines exists only at the BPT level. The technical basis of BPT is comprised of a scale pit with oil skimming, a roughing clarifier, sludge dewatering, and filtration. EPA analyzed BAT–1 using the current BPT as a base, but adding on high rate recycle and mixed-media filtration of blowdown. This BAT option resembles the technical basis of the current NSPS, but with improved design and operation in terms of reduced flows and pollutant concentration. EPA estimates that implementation of limitations based on BAT–1 will result in a flow reduction of 84% over current conditions, and a reduction of 43% of toxic and non-conventional pollutants.

ii. PSES

The technology option for PSES is identical to that for BAT–1. The technical basis of PSES–1 is comprised of a scale pit with oil skimming, a roughing clarifier, sludge dewatering, filtration, and high rate recycle, with mixed-media filtration of blowdown. This technology option would control the pollutants EPA determined pass through. See Section IX. EPA estimates that this would result in a flow reduction of 74% over current conditions, and a 53% reduction in discharge of toxic and non-conventional pollutants.

iii. NSPS/PSNS

The technology options EPA considered for new sources are identical to those it considered for existing dischargers because no other treatment technologies are demonstrated. Therefore, all technology options presented in Table V.C.4–1 as BAT or PSES options also describe NSPS and PSNS options.

b. *Stainless Steels*. Stainless steel integrated and stand-alone hot forming operations discharge indirectly approximately 5,000 pounds of total priority and non-conventional pollutants. No stainless steel hot forming sites discharge wastewater directly.

i. BAT

As stated above, there are no direct discharging stainless facilities in this subcategory, and therefore there are no anticipated pollutant reductions or costs associated with proposing options for BAT. However, EPA is proposing BAT for this segment in the event that a new stainless facility commences operation or if an indirect discharger changes its status to direct before EPA promulgates this rule. Any such dischargers would be subject to BAT (not NSPS) because under 306(b) and EPA's implementing regulations a source is a ''new source'' subject to NSPS only if it commences construction after the promulgation of the final rule in April 2002.

As with the Carbon and Alloy segment, the technology basis of BAT–1 for the Stainless segment consists of a scale pit with oil skimming, a roughing clarifier, sludge dewatering, filtration, and high rate recycle, with mixed-media filtration of blowdown. This BAT option resembles the technology basis of the current NSPS for integrated steelmaking and stand-alone hot forming, but with improved design and operation in terms of reduced flows and pollutant concentration. In addition to BAT–1, EPA intended to analyze a second BAT option, BAT–1 plus metals precipitation of the blowdown, for this segment. However, EPA did not fully develop the costing information for this option because data indicated that adding on metals precipitation for this type of wastestream would not result in additional pollutant loadings removals in systems with well-operated BAT–1 technology in place.

ii. PSES

The PSES–1 option is the same as the BAT–1 option described above. This technology option would control the pollutants EPA determined pass through. See Section IX. EPA estimates that PSES–1 would result in a reduction of 90% of the flow from current levels, and a 66% removal of toxic and non-conventional pollutants.

iii. NSPS/PSNS

The technology options EPA considered for new sources are identical to those it considered for existing dischargers because no other treatment technologies are demonstrated. Therefore, all technology options presented in Table V.C.4–1 as BAT or PSES options also describe NSPS and PSNS options.

5. Non-Integrated Steelmaking and Hot Forming

For this proposed subcategory, EPA considered BAT and PSES technologies for two segments: Carbon and Alloy Steels, and Stainless Steels. The treatment options for the two segments are identical except for the addition of metals precipitation of blowdown for the proposed Stainless Steels segment as BAT–2. Table V.C.5–1 presents the various options considered for non-integrated steelmaking and hot forming, Table V.C.5–2 presents the associated costs, and Table V.C.5–3 presents the associated pollutant reduction estimates.

TABLE V.C.5–1 NON-INTEGRATED STEELMAKING TECHNOLOGY OPTIONS

Treatment unit	Technology options	
	BAT–1	PSES–1
Carbon & Alloy Steels		
Solids removal with clarifier	X	X
Cooling tower [1]	X	X
Mixed-media filtration [2]	X	X
Sludge dewatering	X	X
High-rate recycle	X	X
Blowdown treatment:		
Mixed-media filtration [2]	X	X

[1] Cooling tower is part of the treatment system where necessary and was costed accordingly
[2] Mixed-media filtration of recycled flow or low-volume blowdown flow of hot forming wastewater

Treatment unit	Technology options		
	BAT–1	BAT–2	PSES–1
Stainless Steels			
Solids removal with clarifier	X	X	X
Cooling tower [1]	X	X	X
Mixed-media filtration [2]	X	X	X
Sludge dewatering	X	X	X
High-rate recycle	X	X	X
Blowdown treatment:			
Metals precipitation	....	X	....
Mixed-media filtration [2]	X	X	X

[1] Cooling tower is part of the treatment system where necessary and was costed accordingly
[2] Mixed-media filtration of recycled flow or low-volume blowdown flow of hot forming wastewater

TABLE V.C.5–2 COST OF IMPLEMENTATION FOR NON-INTEGRATED STEELMAKING AND HOT FORMING

[In millions of pre-tax 1997 dollars]

	Technology options	
	BAT–1	PSES–1
Carbon & Alloy Steels		
Number of mills	39	15
Capital costs	18.9	2.5
Annual O&M costs	2.0	0.4
One-time costs	3.9	0.8

	Technology options		
	BAT–1	BAT–2	PSES–1
Stainless Steels			
Number of mills	4	4	4
Capital costs	0.4	3.7	0
Annual O&M costs	0.1	0.6	0
One-time costs	0.2	0.2	0.4

TABLE V.C.5–3 ESTIMATED POLLUTANT LOADING REDUCTION FOR NON-INTEGRATED STEELMAKING AND HOT FORMING

[In million pounds/year]

	Technology options	
	BAT–1	PSES–1
Carbon & Alloy Steels		
Incidental Removal of Conventional Pollutants (TSS andO&G)	2.6	
Priority and Non-Conventional Pollutants	0.34	0.001

	Technology options		
	BAT–1	BAT–2	PSES–1
Stainless Steels			
Incidental Removal of Conventional Pollutants (TSS and O&G)	0.10	0.10	—
Priority and Non-Conventional Pollutants	0.018	0.018	0.012

a. *Carbon and Alloy Steels*. EPA estimated that carbon and alloy steel operations directly discharge approximately 0.18 million pounds of conventional pollutants (TSS and O&G). These operations also discharge approximately 53,000 pounds of total toxic and non-conventional pollutants directly and approximately 14,000 pounds indirectly.

i. BAT

The technology option identified as BAT–1 consists of the same technologies and processes comprising the current BAT for non-integrated steelmaking, but with significant improvements in design and operation resulting in lower flow and reduced discharge of pollutants of concern. EPA also investigated zero discharge as the basis for BAT because some facilities do achieve zero discharge. However, EPA believes it is not feasible for the segment as a whole or any identifiable subsegment to achieve zero discharge because of site-specific circumstances, most significantly the ability to manage effectively process area storm water. Accordingly, the investment cost to retrofit zero discharge at such sites is likely to be too high to be economically achievable for the segment as a whole.

EPA estimates that the BAT–1 technology would result in a reduction of 90% of flow and a 72% reduction in the discharge of toxic and non-conventional pollutants.

ii. PSES

The technology basis for PSES–1 is the same as described as BAT–1. The technological basis for PSES–1 is solids removal, a cooling tower, mixed-media filtration, sludge dewatering, high-rate recycle, and mixed-media filtration of blowdown. This technology option would control the pollutants EPA determined pass through. See Section IX. EPA concludes that all existing indirect discharging facilities in this segment have the equipment in place to achieve this level of performance, and would also not incur additional operating and maintenance costs. See Section V.B for discussion of why EPA concludes that facilities can achieve pollutant reduction without incurring capital or O&M costs. EPA has included in its estimate of costs a one-time fee for facilities to ascertain the changes in water management needed, and to implement them.

EPA estimates that the PSES–1 technology would result in a reduction of flow of 32%, and the reduction in the discharge of toxic and non-conventional pollutants by 33%.

iii. NSPS/PSNS

For NSPS/PSNS in the Carbon & Alloy segment of the Non-Integrated Steelmaking and Hot Forming subcategory, EPA identifies process water and water pollution control technologies that would result in zero discharge. The model NSPS/PSNS technologies consist of treatment and high-rate recycle systems, management of process area storm water, and disposal of low-volume blowdown streams by evaporation through controlled application on electric furnace slag, direct cooling of electrodes in electric furnaces, and other evaporative uses. Operators of 24 existing non-integrated steel mills (in the subcategory as a whole) have reported zero discharge of process wastewater. These facilities are located in various states and produce various products such as bars, beams, billets, flats, plate, rail, rebar, rod, sheet, slabs, small structurals, strip, and specialty sections. EPA has determined that new facilities can easily incorporate new process water treatment and water pollution control at the design stage, thus providing avoiding costs associated with retrofit situations. Consequently, the Agency has identified zero discharge as an appropriate NSPS/PSNS for non-integrated steelmaking and hot forming operations located in any area of the United States and producing any product.

b. *Stainless Steels*. Stainless steel operations discharge directly approximately 180,000 pounds of total conventional pollutants (TSS and O&G). Stainless steel operations discharge approximately 53,000 pounds of total priority and non-conventional pollutants directly and approximately 14,000 pounds indirectly.

i. BAT

With one exception, the technology option identified as BAT–1 consists of the same technologies and processes comprising the current BAT for integrated steelmaking but with significant improvements in design and operation. Unlike the current BAT, however, BAT–1 does not have metals precipitation. In addition to BAT–1, EPA analyzed a second BAT option, BAT–2, which consists of the BAT–1 technology but with metals precipitation. Although metals precipitation of blowdown is part of both the current BAT and BAT–2, EPA's data indicated no additional decrease in pollutant loadings as a result of metals precipitation. EPA also investigated zero discharge as the basis for BAT because some facilities do achieve zero discharge. However, EPA believes it is not feasible for the segment as a whole or any identifiable subsegment to achieve zero discharge because of site-specific circumstances, most significantly the ability to manage effectively process area storm water. Accordingly, the investment cost to retrofit zero discharge at such sites is likely too high to be economically achievable for the segment as a whole.

EPA estimates that selection of the BAT–1 option as the technology basis would result in the reduction of flow by this segment of the non-integrated steelmaking and hot forming subcategory by 52%, and the reduction in the discharge of toxic and non-conventional pollutants by 34%.

ii. PSES

The current technological basis for PSES is solids removal, a cooling tower, mixed-media filtration, sludge dewatering, high-rate recycle, and metals precipitation of blowdown. The technical basis for PSES–1 is the same as described as BAT–1. This technology option would control the pollutants EPA determined pass through. See Section IX.

EPA estimates that the PSES–1 technology would result in a reduction of flow of 89%, and the reduction in the discharge of toxic and non-conventional pollutants by 86%.

iii. NSPS/PSNS

Like the Carbon and Alloy segment, EPA identifies technologies that result in zero discharge as NSPS/PSNS for the Stainless segment of the Non-Integrated Steelmaking and Hot Forming subcategory. See discussion under Section V.C.5.a.iii above. The Agency has identified zero discharge as an appropriate NSPS for non-integrated steelmaking and hot forming operations located in any area of the United States and producing any product.

6. Steel Finishing

For the proposed Steel Finishing subcategory, EPA considered BAT and PSES technologies for the Carbon and Alloy segment, and Stainless segment. The treatment options for the two segments are identical except for the addition of acid purification units for the proposed stainless steels segment. Table V.C.6–1 presents the options considered for steel finishing, Table V.C.6–2 presents the associated costs, and Table V.C.6–3 presents the associated pollutant reduction estimates.

TABLE V.C.6–1 STEEL FINISHING TECHNOLOGY OPTIONS

Treatment units	Technology options	
	BAT–1	PSES–1
Carbon and Alloy Steels		
In-Process Controls:		
Countercurrent rinses	X	X
Recycle of fume scrubber water	X	X
Wastewater Treatment:		
Diversion tank	X	X
Oil/water separation	X	X
Equalization	X	X
Hexavalent chromium reduction [1]	X	X
Multiple-stage pH control for metals precipitation	X	X
Clarification	X	X
Sludge dewatering	X	X

[1] For sites with hexavalent chromium-bearing wastewater.

Treatment units	Technology options	
	BAT–1	PSES–1
Stainless Steels		
In-Process Controls:		
Countercurrent rinsesX	X	
Recycle of fume scrubber water	X	X
Acid purification units [1]	X	X
Wastewater Treatment:		
Diversion tank	X	X
Oil/water separation	X	X
Equalization	X	X
Hexavalent chromium reduction [2]	X	X
Multiple-stage pH control for metals precipitation	X	X
Clarification	X	X
Sludge dewatering	X	X

[1] Applies to sites with sulfuric and nitric/hydrofluoric acid baths for stainless products.
[2] For sites with hexavalent chromium-bearing wastewater.

TABLE V.C.6–2 COST OF IMPLEMENTATION FOR STEEL FINISHING
[in millions of pre-tax 1997 dollars]

	Technology options	
	BAT–1	PSES–1
Carbon and Alloy Steels		
Number of mills	51	31
Capital costs	16.0	6.0
Annual O&M costs	2.5	1.2
One-time costs	1.6	0.8
Stainless Steels		
Number of mills	18	14
Capital costs	16.4	4.0
Annual O&M costs	(1.1)	0.2
One-time costs	0.8	0.4

( ) denotes cost savings due to acid purification.

TABLE V.C.6–3 ESTIMATED POLLUTANT LOADING REDUCTION FOR STEEL FINISHING
[in million pounds/year]

	Technology options	
	BAT–1	PSES–1
Carbon Steels		
Incidental Removal of Conventional Pollutants (TSS and O&G)	2.8	....
Removal of Non-Conventionals	0.24	0.0017
Stainless Steels		
Incidental Removal of Conventional Pollutants (TSS and O&G)	0.72	....
Removal of Non-Conventionals	14	0.031

a. *Carbon and Alloy Steels.* EPA estimated that carbon and alloy steel operations directly discharge approximately 4.6 million pounds of conventional pollutants (TSS and O&G). Carbon and alloy steel operations discharge approximately 1.7 million pounds of total priority and non-conventional pollutants directly and approximately 0.017 million pounds indirectly.

i. BAT

The technical basis of the current BAT limitations consists of recycle of fume scrubber water, a diversion tank, oil/water separation, equalization, hexavalent chrome reduction (where applicable), metals precipitation, clarification, and sludge dewatering. The technical basis for BAT–1 is the same as that for the existing BAT limitations, but with the addition of counter-current rinsing. BAT–1 also reflects significant improvements in design and operation that have occurred in the industry, which result in lower flow and reduced discharge of pollutants of concerns. EPA intended to evaluate a second BAT option, building on this foundation by including mixed-media filtration. However, EPA did not pursue the option because all significant POCs in the effluent after application of BAT–1 system are projected to exist at levels too low to be further treated by this or any other add-on technology. EPA considered zero discharge of regulated pollutants as a third BAT option, since certain facilities have demonstrated the ability to achieve zero discharge. These facilities generally have low production rates and are achieving zero discharge by off-site disposal of a small quantity of wastewater. EPA's data indicates that zero discharge would not be economically achievable for low production facilities as a whole, since availability of affordable off-site hauling and disposal may not be certain, and therefore proposes not to further subcategorize this segment. Zero discharge through off-site disposal would also be cost prohibitive for larger facilities.

EPA estimates that, under BAT–1, flow from the Carbon and Alloy segment of the Steel Finishing subcategory would decrease by 59%, and the amount of toxic and non-conventional pollutants discharged would decrease by 14%.

ii. PSES

The technology basis for the current PSES for steel finishing is the same as that for the current BAT. The PSES–1 technology is the same as the BAT–1 technology. This technology option would control the pollutants EPA determined pass through. See Section IX. EPA estimates that, under PSES–1, flow from this segment of the Steel Finishing subcategory would decrease by 30%, and the amount of toxic and non-conventional pollutants discharged would decrease by 10%.

iii. NSPS/PSNS

The technology options EPA considered for new sources are identical to those it considered for existing dischargers because no other treatment technologies are demonstrated (since availability of affordable off-site hauling and disposal may not be certain.) Therefore, all technology options presented in Table V.C.6–1 as BAT or PSES options also describe NSPS and PSNS options.

b. *Stainless Steels.* Stainless steel operations discharge directly approximately 1.2 million pounds of total conventional pollutants (TSS and O&G). Stainless steel operations discharge directly approximately 31 million pounds of total priority and non-conventional pollutants and approximately 0.31 million pounds indirectly.

i. BAT

Like the Carbon & Alloy segment of the Steel Finishing subcategory, the technology basis of the BAT limitations currently applicable to Stainless Steel mills consists of recycle of fume scrubber water, a diversion tank, oil/water separation, equalization, hexavalent chrome reduction (where applicable), metals precipitation, clarification, and sludge dewatering. The technical basis for BAT–1 of the Stainless segment is the same as that for the current BAT limitations, but with the addition of counter-current rinsing and acid purification units. BAT–1 also reflects significant improvements in design and operation that have occurred in the industry, which result in lower flow and reduced discharge of pollutants of concern. EPA intended to evaluate a second BAT option, building on this foundation by including mixed-media filtration. However, EPA did not pursue the option because all significant POCs in the effluent after application of BAT–1 system are projected to exist at levels too low to be further treated by this or any other add-on technology. EPA considered zero discharge of regulated pollutants as a third BAT option, since certain facilities have demonstrated the ability to achieve zero discharge. EPA's data indicates that zero discharge would not be economically achievable for low production facilities as a whole, since availability of affordable off-site hauling and disposal may not be certain, and therefore proposes not to further subcategorize this segment. Zero discharge through off-site disposal would be cost prohibitive for larger facilities.

EPA estimates that, under BAT–1, flow from this segment of the Steel Finishing subcategory would decrease by 47%, and the amount of toxic and non-conventional pollutants discharged would decrease by 45%. EPA did not perform a detailed pollutant removal or costing analysis for BAT–2 because data indicated that mixed-media filtration achieved no projected pollutant reduction beyond that seen at well-operated facilities with BAT–1.

ii. PSES

The technology basis for the current PSES for steel finishing is the same as that for the current BAT. The PSES–1 technology is the same as the BAT–1 technology. This technology option would control the pollutants EPA determined pass through. See Section IX. EPA estimates that, under PSES–1, flow from the stainless segment of the Steel Finishing subcategory would decrease by 23%, and the amount of toxic and non-conventional pollutants discharged would decrease by 10%.

iii. NSPS/PSNS

The technology options EPA considered for new sources are identical to those it considered for existing dischargers because no other treatment technologies are demonstrated. EPA's data indicates that zero discharge would not be economically achievable for low production facilities as a whole, since availability of affordable off-site hauling and disposal may not be certain. Zero discharge through off-site disposal would be cost prohibitive for larger facilities. Therefore, all technology options presented in Table V.C.6–1 as BAT or PSES options also describe NSPS and PSNS options.

7. Other Operations

The Agency considered BPT and PSES technologies for treatment of wastewater from three segments of this subcategory: Briquetting, Direct-reduced ironmaking (DRI), and Forging operations. There are no existing BPT limitations for these operations.

a. *Briquetting.* Briquetting facilities do not generate process wastewater; therefore, BPT, PSES, PSNS, and NSPS technology options for briquetting are those that result in zero discharge.

b. *DRI.* EPA identified one option for this segment, BPT/BCT–1, which consists of solids removal, clarifier, and high rate recycle with filtration for blowdown wastewater. EPA did not identify a separate BCT technology because nothing more advanced that the BPT technology was cost-reasonable as required by statute. The Agency did not identify BAT limits since the only POCs for the DRI segment are conventionals. Table V.C.7–1 presents the option considered for DRI, Table V.C.7–2 presents the associated costs, and Table V.C.7–3 presents the associated pollutant reduction estimates. The Agency does not present pollutant removal or costing results for DRI facilities, because there are only two mills in this segment and data aggregation or other masking techniques are insufficient to avoid disclosure of information claimed as confidential business information.

TABLE V.C.7–1 DIRECT-REDUCED IRONMAKING BPT/BCT TECHNOLOGY OPTIONS

Treatment units	Technology options
	BPT/BCT
Solids removal with classifier and clarifier	X
Cooling tower	X
Sludge dewatering	X
High-rate recycle	X
Blowdown treatment:	
Mixed-media filtration	X

TABLE V.C.7–2 COST OF IMPLEMENTATION FOR DIRECT-REDUCED IRONMAKING

	Technology option
	BPT
Number of mills	2
Capital costs	*
Annual O&M costs	*
One-time costs	*

*Data aggregation or other masking techniques are insufficient to protect confidential business information.

TABLE V.C.7–3 ESTIMATED POLLUTANT LOADING REDUCTION FOR DIRECT-REDUCED IRONMAKING

[In pounds/year]

	Technology options
	BPT
Total Conventionals (TSS and O&G as HEM)	*
Reduction of Priority and Non-Conventional Pollutants	*

*Data aggregation or other masking techniques are insufficient to protect confidential business information.

c. *Forging.* For forging operations, EPA estimated that sites discharge approximately 1,100 pounds of O&G directly. EPA identified one option for this segment, BPT/BCT, which is an oil/water separator. EPA did not identify a separate BCT technology because nothing more advanced that the BPT technology was cost-reasonable as required by statute. The Agency did not identify BAT limits since the only POCs for the forging segment are conventionals. Table V.C.7–4 presents the option considered for forging, Table V.C.7–5 presents the associated costs, and Table V.C.7–6 presents the associated pollutant reduction estimates.

i. BPT/BCT

EPA estimates that there will be a reduction of O&G of 40% from direct discharging forging operations as a result of implementation of this BPT/BCT option. See Section V.B for discussion of why EPA concludes that facilities can achieve pollutant reduction without incurring capital or O&M costs.

ii. PSES

EPA is not proposing PSES for the forging segment because EPA determined that pollutants present in forging wastewaters do not pass through.

iii. NSPS/PSNS

Since no other treatment technologies have been demonstrated, EPA identifies the same technology basis for NSPS as would be used for BPT. EPA is not identifying PSNS because EPA determined that pollutants present in forging wastewaters do not pass through.

TABLE V.C.7–4 FORGING TECHNOLOGY OPTIONS

Treatment units	Technology options
	BPT/BCT
High-rate recycle	X
Blowdown treatment:	
Oil/water separator	X

TABLE V.C.7–5 COST OF IMPLEMENTATION FOR FORGING

	Technology options
	BPT/BCT
Number of mills	8
Capital costs	0
Annual O&M costs	0
One-time costs	0.1

TABLE V.C.7–6 ESTIMATED POLLUTANT LOADING REDUCTION FOR FORGING

[in pounds/year]

	Technology options
	BPT/BCT
Total Conventionals (O&G as HEM)	440
Reduction of Priority and Non-Conventional Pollutants	0

VI. Economic Analysis

A. Introduction and Overview

This section describes the capital investment and annualized costs of compliance with the proposed effluent limitations guidelines and standards for the iron and steel industry and the potential impacts of these compliance costs on the industry. EPA's economic assessment is presented in detail in the report titled ''Economic Analysis of the Proposed Effluent Limitations Guidelines and Standards for Iron and Steel Manufacturing'' (hereafter ''EA'') and in the rulemaking record. The EA estimates the economic effect of compliance costs on subcategory operations at a site, the combined cost for all subcategory operations at a site for selected cost combinations, aggregate costs for all sites owned by each company, impacts on employment and output, domestic and international markets, and environmental justice issues. EPA also conducted a small business analysis, which estimates effects on small entities, and a cost-effectiveness analysis of all evaluated options.

B. Economic Description of the Iron and Steel Industry and Baseline Conditions

The United States is the third largest steel producer in the world with 12 percent of the market, an annual output of approximately 105 million tons per year, and nearly 145,000 employees. Major markets for steel are service centers and the automotive and construction industries. A service center is an operation that buys finished steel, processes it in some way, and then sells it. Together these three markets account for about 58 percent of steel shipments. The remaining 42 percent is dispersed over a wide range of products and activities, such as agricultural, industrial, and electrical machinery; cans and barrels; and appliances. The building of ships, aircraft, and railways and other forms of transport is included in this group as well.

The iron and steel rulemaking includes sites within the North American Industry Classification System (NAICS) codes 324199 (coke ovens, now part of ''All other petroleum and coal product manufacturing''), 331111 (iron and steel mills), 331210 (steel pipes and tubes), and 331221 (cold finishing of steel shapes). The iron and steel and metal products and machinery effluent guideline rulemakings both may have sites in the last two NAICS codes. Section III.C describes the dividing line between sites with iron and steel operations and sites with metal products and machinery operations.

The iron and steel effluent guideline would apply to approximately 254 iron and steel sites. Of these 254 sites, approximately 216 can be analyzed for post-regulatory compliance impacts at the site level. the remaining 38 sites, 13 did not report data at the site level, and 15 could not be analyzed due to being jointly owned sites or foreign owned sites or newly constructed sites, and 10 were in poor financial health prior to the regulation and are treated as closures under the prevailing baseline conditions. Approximately 60 sites are owned by small business entities.

The 254 sites are owned by 115 companies, as estimated by the EPA survey. The global nature of the industry is illustrated by the fact that 18 companies have foreign ownership. Twelve other companies are joint entities with at least one U.S. company partner. Excluding joint entities and foreign ownership, the data base contains 85 U.S. companies, more than half of which are privately owned. Responses to the EPA survey are the only sources of financial information for these privately-held firms.

The EPA survey collected financial data for the 1995–1997 time period (the most recent data available at the time of the survey). This three-year time frame marks a period of high exports (six to eight million tons per year). This high point in the business cycle allowed companies to replenish retained earnings, retire debt, and take other steps to reflect this prosperity in their financial statements. Even so, an initial analysis of the pre-regulatory condition of 115 companies in the EPA survey indicated that 27 of them would be considered ''financially distressed'' for reasons ranging from start-up companies and joint ventures to established firms that still showed losses.

The financial situation changed dramatically between 1997 and 1998 due to the Asian financial crisis and slow economic growth in Eastern Europe. The following analysis of economic conditions occurring after the 1995–1997 time frame is based upon sources such as trade journal reports, Securities and Exchange Commission (SEC) filings, and trade case filings with the U.S. Department of Commerce and the U.S. International Trade Commission (ITC).

When these countries' currencies fell in value, their steel products fell in price relative to U.S. producers. While the U.S. is and has been the world's largest steel importer (and a net importer for the last two decades), the U.S. was nearly the only viable steel market to which other countries could export during 1998. U.S. imports jumped by 13.3 million tons from 41 million to 54.3 million tons—a 32 percent increase—from 1997 to 1998. About one out of every four tons of steel consumed in 1998 was imported. At least partly due to increased competition from foreign steel mills, the financial health of the domestic iron and steel industry also experienced a steep decline after 1997. This decline is not reflected in the survey responses to the questionnaire, which covered the years 1995 through 1997 and which were the most recent data available at the time the questionnaire was administered in 1998. Based upon publically available sources, EPA learned that, after 1997, at least four companies went into Chapter 11 bankruptcy while at least four additional companies merged with healthier ones.

The flood of imports affected the industry disproportionately. Integrated steelmakers manufacture semi-finished and intermediate products, such as slabs and hot rolled sheet, as well as finished products, such as cold rolled sheet and plate. Integrated steelmakers were hurt most severely during 1998, as imports increased dramatically across most of their product line (for example, slabs, hot rolled sheet and strip, plate, and cold rolled sheet and strip). Mini-mills suffered as well, albeit to a lesser extent financially. The low-priced imports, however, benefitted some companies that purchase semi-finished and intermediate products for further processing.

The industry filed numerous countervailing duty and antidumping cases with the U.S. Department of Commerce and the U.S. ITC charging various countries (for example, Japan, Russia, Brazil) with unfair trade practices concerning carbon and stainless steel products. The ITC found for the U.S. industry in some cases (for example, hot rolled carbon sheet, carbon plate, stainless plate) meaning that it determined that the domestic industry was materially injured or threatened with material injury by the imports. In the case of Russia, the threat of trade remedies was sufficient to have Russia agree to voluntarily limit exports of a variety of steel products to the U.S.

The Clinton administration launched an initiative to address the economic concerns of the steel industry in 1999. The Steel Action Plan includes initiatives focused on eliminating unfair trade practices that support excess capacity, enhanced trade monitoring and assessment, and maintenance of strong trade laws. Further in a separate action on August 17, 1999, President Clinton signed into law an act providing authority for guarantees of loans to qualified steel companies. The Emergency Steel Loan Guarantee Act of 1999 (Pub. L. 106–51) established the Emergency Steel Guarantee Loan Program (13 CFR part 400) for guaranteeing loans made by private sector lending institutions to qualified steel companies. The Program will provide guarantees for up to $1 billion in loans to qualified steel companies. These loans will be made by private sector lenders, with the Federal Government providing a guarantee for up to 85 percent of the amount of the principal of the loan. A qualified steel company is defined in the Act to mean: any company that is incorporated under the laws of any state, is engaged in the production and manufacture of a product defined by the American Iron and Steel Institute as a basic steel mill product, and has experienced layoffs, production losses, or financial losses since January 1998 or that operates substantial assets of a company that meets these qualifications. Certain determinations must be made in order to guarantee a loan, including that credit is not otherwise available to a qualified steel company under reasonable terms or conditions sufficient to meet its financing needs, that the prospective earning power of the qualified company together with the character and value of the security pledged must furnish reasonable assurance of repayment of the loan to be guaranteed, and that the loan must bear interest at a reasonable rate. All loans guaranteed under this Program must be paid in full not later than December 31, 2005 and the aggregate amount of loans guaranteed with respect to a single qualified steel company may not exceed $250 million. According to a March 1, 2000 press release from U.S. Department of Commerce, thirteen companies have applied for loan guarantees totaling $ 901 million.

C. Economic Impact Methodology

1. Introduction

This section (and, in more detail, the EA and record for the proposed rule) evaluates several measures of economic impacts that result from the estimated compliance costs. The analysis in the EA consists of nine major components: (1) An assessment of the number of facilities that could be affected by this rule; (2) an estimate of the annualized aggregate cost for these facilities to comply with the rule using site-level capital, one-time non-capital, and annual operating and maintenance (O&M) costs; (3 and 4) two separate site-level closure analyses to evaluate the impacts of compliance costs for operations in individual subcategories at the site and for the combined cost of the options for all subcategories at the site; (5) an evaluation of the corporate financial distress incurred by the companies in the industry as a result of combined compliance costs for all sites owned by the company; (6) an industry-wide market analysis of the impacts of the compliance costs; (7) an evaluation of secondary impacts such as those on employment and economic output; (8) an analysis of the effects of compliance costs on small entities; and (9) a cost-benefit analysis pursuant to E.O. 12866.

All costs are reported in this section of the preamble in 1999 dollars, with the exception of cost-effectiveness results, which, by convention, are reported in 1981 dollars. The primary source of data for the economic analysis is the Collection of 1997 Iron and Steel Industry Data (Section 308 Survey). Other sources include government data from the Bureau of the Census, industry trade journals, and EPA's Development Document for this rulemaking.

2. Methodology Overview

The starting point for the economic analysis is the cost annualization model, which uses site-specific cost data and other inputs to determine the annualized capital, one-time non-capital, and O&M costs of improved wastewater treatment. This model uses these costs along with the company-specific real cost of capital (discount rate) and corporate tax rate over a 16-year analytic time frame to generate the annual cost of compliance for each option EPA considered. EPA based the 16-year time frame for analysis on the depreciable life for equipment of this type—15 years according to Internal Revenue Service (IRS) rules—plus a mid-year convention for putting the new equipment in operation (*i.e.,* six months between purchase, installation and operation). The model generates the present value and annualized post-tax cost for each option for each site in the survey, which are then used in the subcategory, site, and company analyses, discussed below. In the base case, the Agency adopts an assumption of zero ''cost pass-through'' of compliance costs. The Agency also estimates a ''cost pass-through'' factor from the market model discussed below and uses the result to examine the sensitivity of the impact analysis to the ''cost pass-through'' assumption.

In the subcategory analysis, EPA models the economic impacts of regulatory costs from individual subcategories on a site. The site analysis evaluates the combined costs on the profitability of the site. In both, the model compares the present value of forecasted cash flow over 16 years with the present value of the regulatory option over the same 16-year period. If the present value of the regulatory costs exceeds that of the projected cash flow, it does not make financial sense to upgrade the site. That is, if the present value of projected cash flow is positive before, but negative after, the incurrence of regulatory costs, the site is presumed to close. the analysis, cash flow at the site-level is defined as the sum of net income and depreciation. The measure is widely used within industry in evaluating capital investment decisions because both net income and depreciation (which is an accounting offset against income, but not an actual cash expenditure) are potentially available to finance future investment. However, assuming that total cash flow is available over an extended time horizon (for example, 15 years) to finance investments related to environmental compliance could overstate a site's ability to comply. EPA requests comment (see Section XIV for an amplified discussion) on its use of cash flow as a measure of resources available to finance environmental compliance and suggestions for alternative methodologies.

EPA developed three forecasting models for the iron and steel industry. None of these methods assume any growth in real terms and are calculated in terms of constant 1997 dollars. This conservative approach precludes any site from ''growing'' its way out of financial difficulties imposed by the regulation. Site-specific data are only available for 1995 to 1997. The period form 1998 to 2001 is the rulemaking period and the forecasting methods begin. Promulgation is scheduled for 2002; this is taken as the first year of implementation and the beginning of the 16-year period over which to consider the regulatory impact on projected earnings. The first two models explicitly address the sharp downturn in the industry after 1997 but differ in the strength and duration of recovery and subsequent downturns. That is, both address the cyclicality seen in the iron and steel industry, but with differing magnitudes and timing. The third forecasting method is a three-year average (1995 through 1997) to provide an ''upper bound'' analysis.

EPA calculates the post-regulatory status of a site as the present value of forecasted earnings minus the after-tax present value of regulatory costs. With three forecasting methods, there are three ways to evaluate each site. If a site's post-regulatory status is less than zero, EPA assigned a score of ''1'' for that forecasting method. A site, then, may have a score ranging from zero to three. Closure is the most severe and irrecoverable impact for the site. Such a decision is not made lightly. A business would examine a site's future in several ways and would likely make a determination to close a site only when the weight of evidence so indicated. EPA followed the same decision-making logic; a score of 2 or 3 is interpreted to identify the long-term non-viability of the site.

EPA could not perform an economic analysis of a number of sites at the subcategory and site levels, even though the annualized costs were calculated. these sites, the analysis defaults to the company level. A site may be in this category for several reasons: It is a cost center; it is a ''captive'' site that exists primarily to produce products transferred to other sites under the same ownership; components for the analysis are not recorded on the site's books, only those of the company; or the site's cash flow is negative for at least two years (sufficient to project a negative present value for earnings). Consistent with OMB guidance, EPA estimated postcompliance closures by counting projected closures due solely to the effect of the proposed rule. Direct impacts, such as loss in employment, revenues, production, and (possibly) exports are calculated from projected closures.

EPA evaluated many methods to estimate corporate financial distress reported in the economic literature of the last ten years and chose the ''Altman's Z''' model. This well-known and well-tested model was developed to analyze the financial health of both private and public manufacturing firms. It is based on empirical data and creates a weighted average of financial ratios, thus avoiding the difficulty in interpreting multiple ratios with differing implications for financial health. The single index, Z', is compared against the ranges developed by Altman to indicate ''good,'' ''indeterminate,'' and ''distressed'' financial conditions. EPA examines 1997 financial data (the most recent collected in the survey) to estimate the pre-regulatory company conditions. EPA then aggregates costs for all sites belonging to that company. EPA recalculates Altman's Z' after incorporating the effects of the pollution control compliance costs into the income statement and balance sheet for the company. All companies whose ''Altman's Z' '' score changes such that the company goes from a ''good'' or ''indeterminate'' baseline category to a ''distressed'' postcompliance category are classified as impacted. Such companies may have significant difficulties raising the capital needed to comply with the proposed rule, which can indicate the likelihood of bankruptcy, loss of financial independence, or shedding of assets.

EPA uses input-output analyses to determine the effects of the regulation using national-level employment and output multipliers. Input-output multipliers allow EPA to estimate the effect of a loss in output in the iron and steel industry on the U.S. economy as a whole. Every projected closure has direct impacts in lost employment and output. These direct losses also have repercussions throughout the rest of the economy and the input-output multipliers allow EPA to calculate the national losses in output and employment based on the direct impacts.

EPA also determines the impacts on regional-level employment. The increase in metropolitan statistical area (MSA) unemployment level, or county if non-metropolitan, is calculated for each MSA or county in which there is at least one projected closure.

EPA investigated the industry-wide market effects of the regulation. EPA performed a 3-stage non-linear least-squares econometric estimation of a single-product translog cost model based on 20 years of U.S. Census and industry data. The market supply relationship is derived from the cost function and accounts for the effect of imperfect competition in the steel market. The model also incorporates international trade. The model estimates the supply shift, and the resulting changes in: domestic price, domestic consumption, export demand, and import supply. The model results may be used to estimate a ''cost pass-through'' factor indicating the portion of the increased cost that the iron and steel industry can pass through to the customers.

D. Economic Costs and Impacts of Technology Options by Subcategory

In this section, EPA presents the capital costs and post-tax total annualized costs for each technology option in each subcategory. As discussed above in Section VI.C.2, the cost annualization model derives total post-tax annualized costs from site-specific capital costs, one-time noncapital costs, and operating and maintenance costs, but only capital costs are reported here. a detailed presentation of all costing information, see Section V. As noted in Section VI.B, ten facilities are projected to close under baseline conditions and are not included further in the economic analysis. this reason, the costs and removals reported in Section VI. will differ from the results reported in the engineering analysis in Section V.

The Agency evaluates the first stage of the impact analysis by projecting the impacts associated with the regulatory costs for a single subcategory (or segment) at a site. example, a fully integrated facility may have cokemaking, ironmaking, integrated steelmaking, hot forming and finishing operations, but the postcompliance cash flow analysis only reflects the regulatory costs associated with a single subcategory. This stage of the analysis serves as a screening mechanism for potentially significant impacts for facilities which may be impacted by options in multiple subcategories. Alternatively, for any facility with operations in a single subcategory such as a stand-alone coke plant, this stage represents the complete facility level analysis.

1. Cokemaking

a. By-product Cokemaking.

i. *BAT.* The regulatory compliance costs associated with BAT options 1 and 2 for by-product cokemaking are not projected to result in any postcompliance facility closures. The regulatory compliance costs associated with BAT Options 3 and 4 are projected to result in one postcompliance closure, with a potential job loss of less than 500 full time equivalent employees (FTEs).

TABLE VI.D.1 BAT OPTIONS, COSTS, AND IMPACTS FOR BY-PRODUCT COKEMAKING

OPTION	Pre-tax capital cost (1999$ M)	Post-tax total annualized cost (1999$ M)	Impacts: Closures/Job losses
1	$8.3	$1.0	0/0
2	12.9	4.1	0/0
3	35.8	7.2	1/<500
4	56.1	12.2	1/<500

ii. *PSES.* The regulatory compliance costs associated with PSES options 1, 2, 3, and 4 are not projected to result in any postcompliance closures.

TABLE VI.D.2 PSES OPTIONS, COSTS, AND IMPACTS FOR BY-PRODUCT COKEMAKING

OPTION	Pre-tax capital cost (1999$ M)	Post-tax total annualized cost (1999$ M)	Impacts: Closures/Job losses
1	$0.0	$0.2	0/0
2	6.2	1.8	0/0
3	19.3	4.1	0/0
4	33.4	6.7	0/0

iii. *NSPS and PSNS.* The technology options EPA considered for new sources are identical to those it considered for existing dischargers. Engineering analysis indicates that the cost of installing pollution control systems during new construction is less than the cost of retrofitting existing facilities. Because EPA projects the costs for new sources to be less than those for existing sources and because limited or no impacts are projected for existing sources, EPA does not expect significant economic impacts for new sources.

b. *Non-recovery Cokemaking.* i. *BAT and PSES.* The technology option for both BAT and PSES is zero discharge. No compliance costs are associated with these options as all existing sources currently meet the zero discharge requirement. Since there are no compliance costs, there are no impacts resulting from the BAT and PSES option.

ii. *NSPS and PSNS.* The technology option EPA considered for new sources are identical to those it considered for existing dischargers. No compliance costs are associated with the zero discharge option, just as in the case of existing sources. Likewise, no impacts are projected to result from the new source requirements, just as in the case of existing sources.

2. Ironmaking

a. *BAT and PSES.* The regulatory compliance costs associated with the BAT option and the PSES option are not projected to result in any postcompliance closures. The Agency does not separately present costs for direct and indirect dischargers, because there are less than 3 indirect dischargers and data aggregation or other masking techniques are insufficient to avoid disclosure of information claimed as confidential business information.

TABLE VI.D.3 BAT AND PSES COSTS AND IMPACTS FOR IRONMAKING SUBCATEGORY

	Pre-tax Capital cost (1999 $ M)	Post-tax Total Annualized Cost (1999 $ M)	Impacts
			Closures/Job losses
BAT and PSES	$26.8	$4.5	0/0

b. *NSPS and PSNS.* The technology options EPA considered for new sources are identical to those it considered for existing dischargers. Engineering analysis indicates that the cost of installing pollution control systems during new construction is less than the cost of retrofitting existing facilities. Because EPA projects the costs for new sources to be less than those for existing sources and because limited or no impacts are projected for existing sources, EPA does not expect significant economic impacts for new sources.

3. Integrated Steelmaking

a. *BAT and PSES.* The regulatory compliance costs associated with the BAT option and the PSES option are not projected to result in any postcompliance closures. The Agency does not separately present costs for direct and indirect dischargers, because there are less than 3 indirect dischargers and data aggregation or other masking techniques are insufficient to avoid disclosure of information claimed as confidential business information.

TABLE VI.D.4 BAT AND PSES COSTS AND IMPACTS FOR INTEGRATED STEELMAKING

	Pre-tax capital cost (1999$ M)	Post-tax Total annualized cost (1999$ M)	Impacts
			Closures/ Job losses
BAT and PSES	$17.5	$3.6	0/0

b. *NSPS and PSNS.* The technology options EPA considered for new sources are identical to those it considered for existing dischargers. Engineering analysis indicates that the cost of installing pollution control systems during new construction is less than the cost of retrofitting existing facilities. Because EPA projects the costs for new sources to be less than those for existing sources and because limited or no impacts are projected for existing sources, EPA does not expect significant economic impacts for new sources.

4. Integrated and Stand-alone Hot ming

a. *Carbon and Alloy.* i. *BAT and PSES.* The regulatory compliance costs associated with the BAT option and the PSES option are not projected to result in any postcompliance closures.

TABLE VI.D.5 BAT AND PSES COSTS AND IMPACTS FOR INTEGRATED AND HOT MING, CARBON

	Pre-tax capital cost (1999$ M)	Post-tax Total annualized cost (1999$ M)	Impacts
			Closures/Job losses
BAT	$116.3	$21.2	0/0
PSES	0.3	0.1	0/0

ii. *NSPS and PSNS.* The technology options EPA considered for new sources are identical to those it considered for existing dischargers. Engineering analysis indicates that the cost of installing pollution control systems during new construction is less than the cost of retrofitting existing facilities. Because EPA projects the costs for new sources to be less than those for existing sources and because limited or no impacts are projected for existing sources, EPA does not expect significant economic impacts for new sources.

b. *Stainless.* i. *BAT and PSES.* The regulatory compliance costs associated with the BAT option and the PSES option are not projected to result in any postcompliance closures.

TABLE VI.D.6 BAT AND PSES COSTS AND IMPACTS FOR INTEGRATED AND HOT MING, STAINLESS

	Pre-tax Capital cost (1999$ M)	Post-tax total annualized cost (1999$ M)	Impacts
			Closures/Job losses
BAT:			
PSES	$0.8	$0.1	0/0

ii. *NSPS and PSNS.* The technology options EPA considered for new sources are identical to those it considered for existing dischargers. Engineering analysis indicates that the cost of installing pollution control systems during new construction is less than the cost of retrofitting existing facilities. Because EPA projects the costs for new sources to be less than those for existing sources and because limited or no impacts are projected for existing sources, EPA does not expect significant economic impacts for new sources.

5. Non-Integrated Steelmaking and Hot ming

a. Carbon and Alloy. i. *BAT and PSES.* The regulatory compliance costs associated with the BAT option and the PSES option are not projected to result in any postcompliance closures.

TABLE VI.D.7.—BAT AND PSES COSTS AND IMPACTS FOR NON-INTEGRATED STEELMAKING AND HOT MING, CARBON AND ALLOY

	Pre-tax capital cost (1999$ M)	Post-tax total annualized cost (1999$ M)	Impacts
			Closures/ Job losses
BAT	$19.0	$2.8	0/0
PSES	2.6	0.4	0/0

ii. *NSPS and PSNS.* The technology options EPA considered for new sources are identical to those it considered for existing dischargers, with the addition of a zero discharge option. A substantial number of recently constructed facilities have been able to achieve zero discharge. EPA believes the zero discharge new source option would not present a barrier to entry because as of 1997, a total of 24 nonintegrated facilities of all types have been able to achieve zero discharge.

b. *Stainless.* i. *BAT and PSES.* The regulatory compliance costs associated with either BAT option and the PSES option are not projected to result in any postcompliance closures.

TABLE VI.D.8.—BAT AND PSES COSTS AND IMPACTS FOR NON-INTEGRATED STEELMAKING AND HOT MING, STAINLESS

	Pre-tax capital cost (1999$ M)	Post-tax total annualized cost (1999$ M)	Impacts
			Closures/ Job losses
BAT 1	$0.4	$0.1	0/0
BAT 2	3.8	0.7	0/0
PSES	0.0	0.02	0/0

ii. *NSPS and PSES.* The technology options EPA considered for new sources are identical to those it considered for existing dischargers, with the addition of a zero discharge option. A substantial number of recently constructed facilities have been able to achieve zero discharge. EPA believes the zero discharge new source option would not present a barrier to entry because as of 1997, a total of 24 nonintegrated facilities of all types have been able to achieve zero discharge.

6. Steel Finishing

a. *Carbon and Alloy.* i. *BAT and PSES.* The regulatory compliance costs associated with the BAT option and the PSES option are not projected to result in any postcompliance closures.

TABLE VI.D.9.—BAT AND PSES COSTS AND IMPACTS FOR STEEL FINISHING, CARBON AND ALLOY

	Pre-tax capital cost (1999$ M)	Post-tax total annualized cost (1999$ M)	Impacts
			Closures/ Job losses
BAT	$14.8	$2.9	0/0
PSES	6.2	1.7	0/0

ii. *NSPS and PSNS.* The technology options EPA considered for new sources are identical to those it considered for existing dischargers. Engineering analysis indicates that the cost of installing pollution control systems during new construction is less than the cost of retrofitting existing facilities. Because EPA projects the costs for new sources to be less than those for existing sources and because limited or no impacts are projected for existing sources, EPA does not expect significant economic impacts for new sources.

b. *Stainless* i. *BAT and PSES.* The regulatory compliance costs associated with the BAT option and the PSES option are not projected to result in any postcompliance closures.

TABLE VI.D.10.—BAT AND PSES COSTS AND IMPACTS FOR STEEL FINISHING, STAINLESS

	Pre-tax capital cost (1999$ M)	Post-tax total annualized cost (1999$ M)	Impacts
			Closures/ Job losses
BAT	$15.8	$0.2	0/0
PSES	4.2	0.4	0/0

ii. *NSPS and PSNS.* The technology options EPA considered for new sources are identical to those it considered for existing dischargers. Engineering analysis indicates that the cost of installing pollution control systems during new construction is less than the cost of retrofitting existing facilities. Because EPA projects the costs for new sources to be less than those for existing sources and because limited or no impacts are projected for existing sources, EPA does not expect significant economic impacts for new sources.

7. *Other Operations.*

a. *Direct Reduced Iron.* i. *BPT.* The regulatory compliance costs associated with the BPT option are not projected to result in any postcompliance closures. The Agency does not present costs for direct dischargers, because there are only 2 direct dischargers in this segment and data aggregation or other masking techniques are insufficient to avoid disclosure of information claimed as confidential business information.

TABLE VI.D.11.—BPT COSTS AND IMPACTS DIRECTED REDUCED IRON

	Pre-tax capital cost (1999$ M)	Post-tax total annualized cost (1999$ M)	Impacts
			Closures/ Job losses
BPT			0/0

b. *ging.* i. *BPT.* The regulatory compliance costs associated with the BPT option are not projected to result in any postcompliance closures.

TABLE VI.D.12.—BPT COSTS AND IMPACTS GING

	Pre-tax capital cost (1999$ M)	Post-tax total annualized cost (1999$ M)	Impacts
			Closures/ Job losses
BPT	$0.0	$0.05	0/0

E. Facility Level Economic Impacts of Regulatory Options

In this section, the Agency evaluates the second stage of the impact analysis by projecting the impacts associated with the regulatory costs for all subcategories affected at a facility or site (the terms are used interchangeably). example, a fully integrated facility may have cokemaking, ironmaking, integrated steelmaking, hot forming and finishing operations, and the postcompliance cash flow analysis reflects the regulatory costs associated with all affected operations at the site. This stage of the analysis evaluates the aggregate regulatory costs and impacts upon each facility, which may be subject to the proposed rule and incur compliance costs in multiple subcategories.

The incorporation of the aggregate regulatory costs based upon the proposed options across all subcategories into the postcompliance cash flow analysis does not generate any additional projected facility closures (one facility closure was projected in the first stage of analysis—see Section VI.D.1). The Agency conducted the facility level analysis both with and without allowing for potential cost passthrough and the results are unchanged. The Agency determines the set of proposed options across all subcategories to be economically achievable.

F. Firm Level Impacts

In this section, the Agency evaluates the economic impacts of the regulatory options to the firms that own the facilities potentially subject to this proposed rule. EPA evaluates the third stage of the impact analysis by incorporating the regulatory costs borne by each facility into the financial status of the firm that owns the facility or multiple facilities. example, if a company owns an integrated facility, a stand-alone coke facility, and a stand-alone finishing facility, the aggregate regulatory costs for all three facilities are added to the baseline or precompliance financial conditions of the firm as reflected by the firm income statement and balance sheet. The Agency then calculates the postcompliance Altman Z-score and checks for changes in financial status from good or indeterminate to distressed with any such changes to be considered impacts.

In any combination of costs that includes the adoption of the BAT option for carbon and alloy steel segment of the integrated and stand-alone hot forming subcategory, the Agency projects the financial health of at least one multiple facility firm to deteriorate from indeterminate to financially distressed. A financially distressed company may have significant difficulties raising the capital needed to comply with the proposed rule, which can lead to the sale of assets, likelihood of bankruptcy, or the loss of financial independence. The one or more firms that are projected to be impacted have a current work force numbering in the several thousands. In contrast, any combination of costs that does not include adoption of the BAT option for the carbon and alloy steel segment of the integrated and stand-alone hot forming subcategory, the Agency projects no firms to experience an impact.

The Agency projected only one postcompliance facility closure in the facility-level analysis for the entire proposed rule. This result indicates the viability of virtually all facilities as going concerns. The firm level analysis projects at least one firm may be financially distressed postcompliance. Given the continued viability of virtually all facilities including those in the carbon and alloy steel segment of the integrated and stand-alone hot forming subcategory, EPA expects that a financially distressed firm would respond to the financial distress by selling assets. The sale of assets (such as a facility) may include the continued operation by the purchasing firm, resulting in limited job losses or secondary impacts. The Agency determines the set of proposed options across all subcategories to be economically achievable.

G. Community Impacts

The Agency evaluates community impacts by examining the potential increase in county or metropolitan statistical area (MSA) unemployment. The Agency assumes all employees of the affected facilities reside in the county (if the county is not part of a larger metropolitan area) or metropolitan area in which the facilities are located. In the case of the single facility closure/firm associated with the by-product cokemaking BAT options 3 and 4, the impacts increase the county unemployment rate by 0.6 percent.

In the case of the BAT option for the carbon and alloy steel segment of the integrated and stand-alone hot forming subcategory, the Agency examines the effects if the one or more firms that become financially distressed lay off all of its workers, which corresponds to a worst case scenario. The one or more distressed firms have multiple facilities in various locations. The Agency assumes all employees of each affected facility reside in the county or metropolitan area in which the facility is located. The resulting impacts range from increasing the metropolitan unemployment rate by less than 0.1 percentage points to increasing the metropolitan unemployment rate by 2.1 percentage points, depending on the size of the affected community, the size of the affected facility and the prevailing unemployment rate. Although the Agency recognizes that an increase in community level unemployment of 2.1 percentage points would be significant, the Agency believes the actual community impacts associated with the one or more distressed firms would be much less than the worst case scenario presented here, given the results of the firm level analysis described above in Section VI.F and the opportunity for financially distressed firms to sell, rather than close, a viable facility.

H. eign Trade Impacts

The Agency evaluates the potential for foreign trade impacts by application of the market model. The aggregate regulatory compliance costs are incorporated to estimate the postcompliance impacts. If the proposed set of options is adopted, the analysis indicates 0.23 to 0.25 percent decrease in exports (decreases of $9.2 million to $9.9 million) and 0.11 to 0.12 percent increase in imports (increases of $7.5 million to $8.1 million).

I. Small Business Analysis

Based upon information provided in the Collection of 1997 Iron and Steel Industry Data (Section 308 Survey), the Agency was able to reasonably determine the appropriate SIC classification for each company. EPA applied the relevant SBA size standard for each SIC to determine whether each company was to be considered a small entity. SBA has recently finalized size standards for each NAICS industry; however, EPA determined that no companies change classification under the new NAICs standards. The SIC classifications observed were predominantly SICs 3312, 3316 and 3317, with a number of other industries also reported. The relevant size standards varied from 500 to 1500 employees, and included a few revenue based standards. EPA identified an estimated 34 small entities that may be affected by the rule among the estimated 115 total companies potentially affected by the rule. EPA has fully evaluated the economic achievability of the proposed rule to affected small entities. The economic achievability analysis was conducted using a discounted cash flow approach for the facility analysis and the Altman Z test for the firm analysis (for a full discussion, see Section VI.C.). EPA projects that one small entity (a firm owning a single facility) may incur an impact such as facility closure or firm failure. Further, for small entities, EPA examined the compliance cost to revenue ratio to identify any other potential impacts of the rule upon small entities. Using the most stringent set of co-proposed options, EPA has determined that the range is between 0 and 1.91 percent with only three entities experiencing an impact of greater than 1%.

J. Cost-Benefit Analysis

The Agency estimates the total monetized social costs of the proposed rule range between $56.5 million and $61.4 million and the total monetized social benefits range between $1.1 million and $2.7 million.

K. Cost-Effectiveness Analysis

This section provides the cost-effectiveness analysis of the BAT and PSES regulatory options by subcategory. The cost-effectiveness analysis compares the total annualized cost incurred for a regulatory option to the corresponding effectiveness of that option in reducing the discharge of pollutants.

Cost-effectiveness calculations are used during the development of effluent limitations guidelines and standards to compare the efficiency of one regulatory option in removing pollutants to another regulatory option. Cost-effectiveness is defined as the incremental annual cost of a pollution control option in an industry subcategory per incremental pollutant removal. The increments are considered relative to another option or to a benchmark, such as existing treatment. In cost-effectiveness analyses, pollutant removals are measured in toxicity normalized units called ''pound-equivalents.'' The cost-effectiveness value, therefore, represents the unit cost of removing an additional pound-equivalent (lb. eq.) of pollutants. In general, the lower the cost-effectiveness value, the more cost-efficient the regulation will be in removing pollutants, taking into account their toxicity. While not required by the Clean Water Act, cost-effectiveness analysis is a useful tool for evaluating regulatory options for the removal of toxic pollutants. Cost-effectiveness analysis does not take into account the removal of conventional pollutants (*e.g.,* oil and grease, biochemical oxygen demand, and total suspended solids).

the cost-effectiveness analysis, the estimated pound-equivalents of pollutants removed were calculated by multiplying the number of pounds of each pollutant removed by the toxic weighting factor for each pollutant. The more toxic the pollutant, the higher will be the pollutant's toxic weighting factor; accordingly, the use of pound-equivalents gives correspondingly more weight to pollutants with higher toxicity. Thus, for a given expenditure and pounds of pollutants removed, the cost per pound-equivalent removed would be lower when more highly toxic pollutants are removed than if pollutants of lesser toxicity are removed. Annual costs for all cost-effectiveness analyzes are reported in 1981 dollars so that comparisons of cost-effectiveness may be made with regulations for other industries that were issued at different times.

1. Cokemaking

a. *By-product Cokemaking*. i. *BAT*. The first three BAT options for this segment display significant incremental pollutant reductions (as measured in lb-equivalents). BAT option 4 results in very limited additional pollutant removals beyond BAT option 3 with very substantial increases in capital and total annualized costs.

TABLE VI.K.1 BAT REMOVALS AND COST-EFFECTIVENESS FOR BY-PRODUCT COKEMAKING

OPTION	Pre-tax total annualized cost (1999$ M)	Removals (lb-eq)	Incremental cost effective-ness (1981$/lb-eq)	Average cost effectiveness (1981$/lb-eq);
1	$0.9	56,300	$10	$10
2	4.4	71,200	134	36
3	8.9	147,600	35	35
4	15.8	147,700	38,300	63

ii. *PSES.* All PSES options result in significant removals with PSES option 1 imposing very low incremental costs, PSES option 2 imposing moderate incremental costs, PSES option 3 providing very substantial removals with relatively modest incremental costs, and PSES option 4 providing limited additional removals with higher incremental costs.

TABLE VI.K.2 PSES REMOVALS AND COST-EFFECTIVENESS FOR BY-PRODUCT COKEMAKING

OPTION	Pre-tax total annualized cost (1999$ M)	Removals (lb-eq)	Incremental cost effective-ness (1981$/ lb-eq)	Average cost effectiveness (1981$/lb-eq);
1	$0.3	3,400	$52	$52
2	2.3	5,600	527	240
3	5.2	48,500	39	62
4	8.8	51,400	729	100

b. *Non-recovery Cokemaking.* i. *BAT and PSES.* The Agency is evaluating a technology option for the Non-recovery Cokemaking Segment which is based on zero discharge for BAT and PSES and is estimated to have no associated regulatory compliance costs as all existing non-recovery cokemaking facilities achieve the zero discharge limitation. As a result, a cost-effectiveness analysis cannot be constructed for this segment.

2. Ironmaking

a. *BAT and PSES.* The evaluated BAT option yields substantial removals with relatively low compliance costs. The Agency does not separately present results for direct and indirect dischargers, because there are fewer than 3 indirect dischargers and data aggregation or other masking techniques are insufficient to avoid disclosure of information claimed as confidential business information.

TABLE VI.K.3 BAT AND PSES REMOVALS AND COST-EFFECTIVENESS FOR IRONMAKING

	Pre-tax total annualized cost (1999$ M)	Removals (lb-eq)	Incremental cost effective-ness (1981$/ lb-eq)
BAT and PSES	$5.6	63,200	$52

3. Integrated Steelmaking

a. *BAT and PSES.* The evaluated BAT option yields substantial removals with relatively low compliance costs. The Agency does not separately present results for direct and indirect dischargers, because there are less than 3 indirect dischargers and data aggregation or other masking techniques are insufficient to avoid disclosure of information claimed as confidential business information.

TABLE VI.K.4—BAT AND PSES REMOVALS AND COST EFFECTIVENESS FOR INTEGRATED STEELMAKING SUBCATEGORY

	Pre-tax total annualized cost (1999$ M)	Removals (lb-eq)	Incremental cost effectiveness (1981 $/lb-eq)
BAT and PSES	$5.0	102,600	$29

4. Integrated and Stand-Alone Hot ming

a. *Carbon and Alloy.* i. BAT and PSES. The evaluated BAT option yields substantial removals with moderate compliance costs. The evaluated PSES option yields very limited removals with a relatively low costs.

TABLE VI.K.5—BAT AND PSES REMOVALS AND COST-EFFECTIVENESS, INTEGRATED AND STAND-ALONE HOT MING, CARBON AND ALLOY

	Pre-tax total annualized cost (1999$ M)	Removals (lb-eq)	Incremental cost effectiveness (1981$/lb-eq)
BAT	$28.6	87,200	$191
PSES	0.1	100	319

b. *Stainless.* i. *BAT and PSES.* There were no directly discharging facilities identified in the EPA survey. The evaluated PSES option yields extremely limited removals with a relatively low costs.

5. Nonintegrated Steelmaking and Hot ming

a. *Carbon and Alloy.* i. *BAT and PSES* The evaluated BAT option yields substantial removals with relatively low compliance costs. The evaluated PSES option yields very small removals with modest compliance costs.

TABLE VI.K.6—BAT AND PSES REMOVALS AND COST-EFFECTIVENESS, INTEGRATED AND STAND-ALONE HOT MING, STAINLESS

	Pre-tax total annualized cost (1999$ M)	Removals (lb-eq)	Incremental cost effectiveness (1981$/lb-eq)
BAT			
PSES	$0.2	10	$12,000

5. Nonintegrated Steelmaking and Hot ming

a. *Carbon and Alloy.* i. *BAT and PSES.* The evaluated BAT option yields substantial removals with relatively low compliance costs. The evaluated PSES option yields very small removals with modest compliance costs.

TABLE VI.K.7—BAT AND PSES REMOVALS AND COST-EFFECTIVENESS, NONINTEGRATED STEELMAKING AND HOT MING, CARBON AND ALLOY

	Pre-tax total annualized cost (1999$ M)	Removals (lb-eq)	Incremental cost effectiveness (1981 $/lb-eq)
BAT	$4.2	39,100	$62
PSES	0.6	40	9,200

b. *Stainless.*s i. *BAT and PSES.*

The evaluated BAT 1 and PSES 1 options both yield substantial removals with relatively low compliance costs, while the BAT 2 options yields very limited removals with substantial costs.

TABLE VI.K.8—BAT AND PSES REMOVALS AND COST-EFFECTIVENESS NONINTEGRATED STEELMAKING AND HOT MING, STAINLESS

	Pre-tax total annualized cost (1999$ M)	Removals (lb-eq)	Cost effectiveness (1981 $/lb-eq) incremental
BAT 1	$0.1	1,873	$35
BAT 2	0.9	1,874	440,000
PSES 1	0.03	1,501	11

6. Steel Finishing

a. *Carbon and Alloy.* i. *BAT and PSES.*

The evaluated BAT option yields substantial removals with relatively low compliance costs. The evaluated PSES option yields very small removals with modest compliance costs.

TABLE VI.K.9—BAT AND PSES REMOVALS AND COST-EFFECTIVENESS, STEEL FINISHING, CARBON AND ALLOY

	Pre-tax total annualized cost (1999$ M)	Removals (lb-eq)	Incremental cost effectiveness (1981 $/lb-eq)
BAT	$3.5	16,600	$126
PSES	1.9	400	2,900

b. *Stainless.*

i. BAT and PSES

The evaluated BAT option yields substantial removals with very low compliance costs. The evaluated PSES option yields limited removals with modest compliance costs.

TABLE VI.K.10—BAT AND PSES REMOVALS AND COST-EFFECTIVENESS, STEEL FINISHING, STAINLESS

	Pre-tax total annualized cost (1999$ M)	Removals (lb-eq)	Incremental cost effectiveness (1981 $/lb-eq)
BAT	$0.2	69,700	$2
PSES	0.6	650	525

7. Other Operations

The Agency is evaluating technology options for Direct Reduced Ironmaking and ging segments for the control of only conventional parameters at BPT (see Section VI.L). The Agency is evaluating a technology option for the Briquetting Segment which is based on zero discharge and is estimated to have no associated regulatory compliance costs. As a result, a cost-effectiveness analysis cannot be constructed for these segments.

L. Cost-Reasonableness Analysis

As stated in Section VI.K, the Agency is evaluating technology options for the Direct Reduced Ironmaking and ging segments of the Other Operations Subcategory for the control of only conventional parameters at BPT. CWA Section 304(b)(1)(B) requires a cost-reasonableness assessment for BPT limitations. In determining BPT limitations, EPA must consider the total cost of treatment technologies in relation to the effluent reduction benefits achieved by such technology. This inquiry does not limit EPA's broad discretion to adopt BPT limitations that are achievable with available technology unless the required additional reductions are wholly out of proportion to the costs of achieving such marginal reduction.

The cost-reasonableness ratio is average cost per pound of pollutant removed by a BPT regulatory option. The cost component is measured as pre-tax total annualized costs (1999$). In this case, the pollutants removed are conventional pollutants although in some cases, removals may include priority and nonconventional pollutants. the Direct Reduced Ironmaking segment, the evaluated BPT option 1 removes approximately 800 pounds of conventional pollutants with a cost-reasonableness ratio of $6. the ging segment, the evaluated BPT option 1 removes approximately 500 pounds of conventional pollutants with a cost-reasonableness ratio of $15. EPA considers the cost-reasonableness ratio to be acceptable and the proposed option to be cost-reasonable in both segments.

VII. Water Quality Analysis and Environmental Benefits

EPA evaluated the environmental benefits of controlling the discharges of 60 priority and nonconventional pollutants from iron and steel facilities to surface waters and POTWs in national analyses of direct and indirect discharges. A total of 125 analytes were found in iron and steel effluents. Ambient water quality criteria (AWQC) or toxicity profiles are established for 60 of those analytes. Discharges of these pollutants into freshwater and estuarine ecosystems may alter aquatic habitats, adversely affect aquatic biota, and adversely impact human health through the consumption of contaminated fish and drinking water.

Furthermore, these pollutants may also interfere with POTW operations in terms of inhibition of activated sludge or biological treatment and contamination of sewage sludges, thereby limiting the methods of disposal for sewage sludge and the POTW's costs (though, as noted below, there is no evidence of this for this sector). Most of these pollutants have at least one known toxic effect (human health carcinogen and/or systemic toxicant or aquatic toxicant). In addition, many of these pollutants bioaccumulate in aquatic organisms and persist in the environment.

The Agency did not evaluate the effects of conventional pollutants discharged from iron and steel mills on aquatic life and human health because of a lack of quantitative AWQC. EPA did not evaluate the effects of conventional pollutants on POTWs because POTWs are designed to treat these pollutants. However, the discharge of a conventional pollutant such as total suspended solids (TSS) or oil & grease can have adverse effects on aquatic life and the environment. example, habitat degradation can result from increased suspended particulate matter that reduces light penetration, and thus primary productivity, or from accumulation of suspended particles that alter benthic spawning grounds and feeding habitats.

Oil and grease produce toxic effects on aquatic organisms (*i.e.,* fish, crustacea, larvae and eggs, gastropods, bivalves, invertebrates, and flora). The marine larvae and benthic invertebrates, appear to be the most intolerant of petroleum products, particularly the water-soluble compounds, at concentrations ranging from 0.1 ppm to 25 ppm and 1 ppm to 6,100 ppm, respectively. However, since oil and grease is not a definitive chemical category, but instead includes many organic compounds with varying physical, chemical, and toxicological properties, it is difficult for EPA to establish a numerical criterion which would be applicable to all types of oil and grease. this reason, EPA does not model the effects of oil and grease on the environment.

Of a total of 254 iron and steel facilities, EPA evaluated 150 facilities, of which 103 are direct wastewater dischargers that discharge up to 60 pollutants to 77 receiving streams and 47 are indirect wastewater dischargers discharging up to 60 pollutants to 43 receiving streams. EPA did not evaluate 56 facilities with zero discharge or 48 facilities for which EPA had insufficient data to conduct the water quality analysis. To estimate some of the benefits from the improvements in water quality expected to result from this rule, instream concentration estimates are modeled and then compared to aquatic life and human health ambient water quality criteria (AWQC) guidance documents published by EPA or to toxic effect levels. States often consult these water quality criteria guidance documents when adopting water quality criteria as part of their water quality standards. However, because those State-adopted criteria may vary, for this analysis EPA used the nationwide criteria guidance as the representative values for the particular pollutants. EPA also modeled the effects of iron and steel discharges on POTWs. Results of the of the 150 facilities were extrapolated to the national level of 198 direct and indirect dischargers, using the statistical methodology for estimating costs, loads, and economic impacts.

Since at least 20% of the iron and steel facilities discharge in multiple waste subcategories, and many waterbody reaches receive discharges from more than one iron and steel facility, EPA chose to perform the environmental assessment analyses on a reach-by-reach basis. The reach-by-reach basis has the advantage over a subcategory-specific basis in that it more accurately predicts the overall effects of the rule on the environment.

In addition, EPA reviewed the CWA section 303(d) lists of impaired waterbodies developed by States in 1998 and noted that at least 17 waterbodies, identified with industrial point sources as a potential source of impairment, receive direct discharges from iron and steel facilities (and other sources). EPA also identified 12 waterbodies with fishing advisories for iron and steel pollutants of concern (mercury) that receive direct discharges from iron and steel facilities (and other sources).

EPA expects a variety of human health, environmental, and economic benefits to result from reductions in effluent loadings (see *Environmental Assessment of the Proposed Effluent Guidelines for the Iron and Steel Industry,* (Environmental Assessment)). In particular, the benefits assessment addresses the following benefit categories: (a) Human health benefits due to reductions in excess cancer cases; (b) human health benefits due to reductions in lead exposure; (c) human health benefits due to reductions in noncarcinogenic hazard (systemic); (d) ecological and recreational benefits due to improved water quality with respect to toxic pollutants; and (e) benefits to POTWs from reductions in interference, pass through, and biosolid contamination, and elimination of some of the efforts associated with establishing local pretreatment limits.

A. Reduced Human Health Cancer Risk

EPA expects that reduced loadings to surface waters associated with the proposed rule would reduce excess cancer cases by approximately 0.01 per year with estimated monetized benefits of $24,000 to $126,000 ($1997). These estimated benefits are attributable to reducing the cancer risks associated with consuming contaminated fish tissue. EPA developed these benefit estimates by applying an existing estimate of the value of a statistical life to the estimated number of excess cancer cases avoided. The estimated range of the value of a statistical life used in this analysis is $2.4 million to $12.6 million ($1997). EPA's SAB recently recommended that VSL's be adjusted downward using a discount factor to account for latency in cases (such as cancer) where there is a lag between exposure and mortality. This was not done in the current analysis because EPA requires more information to estimate latency periods associated with cancers caused by Iron and Steel pollutants. example, the risk assessments for several pollutants are based on data from animal bioassays; these data are not sufficiently reliable to estimate a latency period for humans. Extrapolating the results to the national level results in a 0.02 cancer case reduction and a monetized benefit of $48,000 to $252,000.

B. Reduced Lead Health Risk

the proposed rule, EPA expects that reduced loadings to surface waters from iron and steel discharges will reduce lead levels in those waters. Under the proposed treatment levels, the ingestion of lead-contaminated fish tissues by recreational and subsistence anglers would be reduced at 79 waterbodies. Because elevated blood lead levels can cause intellectual impairment in exposed children 0 to 6 years of age, benefits to the at-risk child populations are quantified by estimating the reduced potential IQ point loss. Benefits from reduced adult and neonatal mortality are also estimated. The benefits are quantified and monetized using methodologies developed in the Retrospective Analysis of the Clean Air Act (Final Report to Congress on Benefits and Costs of the Clean Air Act, 1970 to 1990; EPA 410–R–97–002). EPA estimates that this proposed regulation would reduce cases of these adverse health effects; the total benefit for these reductions would be approximately $0.62 to $0.98 million ($1997). Extrapolating the results to the national level results in monetized benefits of $0.64 to $1.01 million ($1997) due to reduced ingestion of lead-contaminated fish tissues at 104 waterbodies.

C. Reduced Noncarcinogenic Human Health Hazard

Exposure to toxic substances poses risk of systemic and other effects to humans, including effects on the circulatory, respiratory or digestive systems and neurological and developmental effects. This proposed rule is expected to generate human health benefits by reducing exposure to these substances, thus reducing the hazards of these associated effects. EPA expects that reduced loadings to surface waters would reduce the number of persons potentially exposed to noncarcinogenic effects, due to consumption of contaminated fish tissue, by approximately 900 people for both the sample set and the national extrapolation of iron and steel facilities. Presently EPA does not have a methodology for monetizing these benefits.

D. Improved Ecological Conditions and Recreational Activity

EPA expects this proposed rule to generate environmental benefits by improving water quality. There is a wide range of benefits associated with the maintenance and improvement of water quality. These benefits include use values (*e.g.,* recreational fishing), ecological values (*e.g.,* preservation of habitat), and passive use (intrinsic) values. example, water pollution might affect the quality of the fish and wildlife habitat provided by water resources, thus affecting the species using these resources. This in turn might affect the quality and value of recreational experiences of users, such as anglers fishing in the affected streams. EPA considers the value of the recreational fishing benefits and intrinsic benefits resulting from this proposed rule, but does not evaluate the other types of ecological and environmental benefits (*e.g.,* increased assimilative capacity of the receiving stream, protection of terrestrial wildlife and birds that consume aquatic organisms, and improvements to other recreational activities, such as swimming, boating, water skiing, and wildlife observation) due to data limitations.

Modeled end-of-pipe pollutant loadings are estimated to decline by about 22 percent, from 227 million pounds per year under current conditions to 177 million pounds per year under this proposed rule (from 253 million pounds per year down to 198 million pounds per year on a national level). The analysis comparing modeled instream pollutant concentration to AWQC estimates that current discharge loadings result in excursions at 44 streams receiving the discharge from iron and steel facilities. The proposed rule would reduce excursions to 41 receiving streams. The number of receiving streams with excursions would be reduced from 55 to 51 streams at the national level.

EPA estimates that the annual monetized recreational benefits to anglers associated with the expected changes in water quality range from $188,000 to $671,000 ($1997). Monetized benefits extrapolated to the national level are $252,000 to $900,000 ($1997). EPA evaluates these recreational benefits by applying a model that considers the increase in value of a ‘‘contaminant-free fishery’’ to recreational anglers resulting from the elimination of all pollutant concentrations in excess of AWQC at 3 of the 44 receiving streams (4 of the 55 receiving streams on a national level). The monetized value of impaired recreational fishing opportunity is estimated by first calculating the baseline value of the receiving stream using a value per person day of recreational fishing, and the number of person-days fished on the receiving stream. The value of improving water quality in this fishery, based on the increase in value to anglers of achieving contaminant-free fishing, is then calculated.

In addition, EPA estimates that the annual monetized intrinsic benefits to the general public, as a result of the same improvements in water quality, range from at least $94,000 to $336,000 ($1997) for the sample set and from at least $126,000 to $450,000 ($1997) at the extrapolated national level. These intrinsic benefits are estimated as half of the recreational benefits and may be under or overestimated.

E. Effect on POTW Operations

EPA considers two potential sources of benefits to POTWs from this proposed regulation: (1) Reductions in the likelihood of interference, pass through, and biosolid contamination problems; and (2) reductions in costs potentially incurred by POTWs in analyzing toxic pollutants and determining whether to, and the appropriate level at which to, set local limits.

EPA has concluded from its analysis that under current conditions POTW operation and biosolid quality are not significantly affected by discharges from iron and steel mills. EPA is presently researching anecdotal evidence from POTW operators to support or refute this position.

F. Other Benefits Not Quantified

The above benefit analyses focus mainly on identified compounds with quantifiable toxic or carcinogenic effects. This potentially leads to an underestimation of benefits, since some pollutant characterizations are not considered. example, the analyses do not include the benefits associated with reducing the particulate load (measured as TSS), or the oxygen demand (measured as BOD5 and COD) of the effluents. TSS loads can degrade ecological habitat by reducing light penetration and primary productivity, and from accumulation of solid particles that alter benthic spawning grounds and feeding habitats. BOD5 and COD loads can deplete oxygen levels, which can produce mortality or other adverse effects in fish, as well as reduce biological diversity.

G. Summary of Benefits

EPA estimates that the annual monetized benefits, at the national level, resulting from this proposed rule range from $1.07 million to $2.61 million ($1997). Table VII.F.1 summarizes these benefits, by category. The range reflects the uncertainty in evaluating the effects of this proposed rule and in placing a dollar value on these effects. As indicated in Table VII.F.1, these monetized benefits ranges do not reflect some benefit categories, including improved ecological conditions from improvements in water quality due to reductions in conventional pollutants. Therefore, the reported benefit estimate may understate the total benefits of this proposed rule.

TABLE VII.F.1—POTENTIAL ECONOMIC BENEFITS (NATIONAL LEVEL)

Benefit category	Millions of 1997 dollars per year
Reduced Cancer Risk	0.05–0.25
Reduced Lead Health Risk.	0.64–1.01
Reduced Noncarcinogenic Hazard.	Unquantified
Improved Ecological Conditions.	Unquantified
Improved Recreational Value.	0.25–0.90
Improved Intrinsic Value.	0.13–0.45

TABLE VII.F.1—POTENTIAL ECONOMIC BENEFITS (NATIONAL LEVEL)—Continued

Benefit category	Millions of 1997 dollars per year
Reduced Biosolid Contamination at POTW.	
Improved POTW Operation (inhibition).	
Reduced Costs at POTWs.	
Total Monetized Benefits.	1.07–2.61

VIII. Non-Water Quality Environmental Impacts

Sections 304(b) and 306 of the Act require EPA to consider non-water quality environmental impacts associated with effluent limitations guidelines and standards. In accordance with these requirements, EPA has considered the potential impact of today's technical options on air emissions, solid waste generation, and energy consumption. While it is difficult to balance environmental impacts across all media and energy use, the Agency has determined that the impacts identified below are acceptable in light of the benefits associated with compliance with the proposed effluent limitations guidelines and standards.

A. Air Pollution

Various subcategories within the Iron and Steel Industry generate process waters that contain significant concentrations of organic and inorganic compounds, some of which are listed as Hazardous Air Pollutants (HAPs) in Title III of the Clean Air Act (CAA) Amendments of 1990. The Agency has developed National Emission Standards for Hazardous Air Pollutants (NESHAPs) under section 112 of the Clean Air Act (CAA) that address air emissions of HAPs for certain manufacturing operations. Subcategories within the Iron and Steel industry where NESHAPs are applicable include cokemaking (58 FR 57898, October 1993) and steel finishing with chromium electroplating and chromium anodizing (60 FR 4948, January 1995).

the cokemaking subcategory, maximum achievable control technology (MACT) standards are currently being developed by EPA for pushing, quenching, and battery stacks. Like effluent guidelines, MACT standards are technology based. The CAA sets maximum control requirements on which MACT can be based for new and existing sources. By-products recovery operations in the cokemaking subcategory remove the majority of HAPs through processes that collect tar, heavy and light oils, ammonium sulfate and elemental sulfur. Ammonia removal by steam stripping could generate a potential air quality issue if uncontrolled; however ammonia stripping operations at cokemaking facilities capture vapors and convert ammonia to either an inorganic salt or anhydrous ammonia, or destroy the ammonia.

Biological treatment of cokemaking wastewater can potentially emit hazardous air pollutants if significant concentrations of volatile organic compounds (VOCs) are present. To estimate the maximum air emissions from biological treatment, the individual concentrations of all VOCs in cokemaking wastewater entering the biological treatment system were multiplied by the maximum design flow and the operational period reported in the U.S. EPA Collection of 1997 Iron and Steel Industry Data to determine annual VOC loadings to the biological treatment unit. The concentrations of the individual VOCs entering the biological treatment system was determined from the sampling episode data. Assuming all the VOCs entering the biological treatment system are emitted to the atmosphere (no biological degradation), the maximum VOC emission rate would be approximately 1,800 pounds per year. See Technical Development Document, Section 13.

Treatment technology options proposed for integrated and non-integrated steelmaking operations focus on removal of suspended solids, dissolved metals and oils from process wastewaters. Under ambient conditions, the vapor pressure of these pollutants is such that insignificant volatilization occurs, even with extended atmospheric contact in open-top treatment units and induced draft cooling towers. EPA does not project any net increase in air emissions if facilities employ the proposed model technologies. As such, no adverse air impacts are expected to occur as a result of the proposed regulations.

B. Solid Waste

Solid waste, including hazardous and nonhazardous sludges and waste oil, will be generated from a number of the model treatment technologies used to develop the proposed effluent limitations guidelines and standards. Solid wastes include sludge from biological treatment systems, chemical precipitation and clarification systems, and gravity separation and dissolved air flotation systems. EPA accounted for the associated costs related to on-site recovery and off-site treatment and disposal of the solid wastes generated due to the implementation of the various technology options. These costs were included in the economic evaluation for the proposed regulation.

Biological nitrification proposed as the technology basis for ammonia removal from cokemaking wastewaters will produce a biological treatment sludge that facilities would need to dispose. EPA estimates that approximately 0.39 million pounds (dry wt.) per year of additional biological treatment sludge will be generated by the cokemaking subcategory as a result of lower effluent ammonia limits. The non-hazardous biological treatment sludges can be disposed in a Subtitle D landfill, recycled to the coke ovens for incineration, or land applied.

Additional solids captured by roughing clarifiers and sand filters proposed for recycle water systems within the integrated and non-integrated steelmaking facilities (blast furnace, sinter plant, BOF, vacuum degasser, continuous caster, hot forming mill) will account for an additional 1.8 percent of the solids currently being collected in scale pits and classifiers. Data provided in the industry surveys indicates the total annual sludge and scale production from all of these facilities, including stand-alone hot formers, was approximately 500,000 tons/year (dry weight). Solids removal equipment proposed for this rule is expected to remove an additional 9,000 tons per year of dry wastewater treatment sludge.

Sludges generated at steel finishing operations may be classified as hazardous under the Resource Conservation and Recovery Act (RCRA) as either a listed or characteristic waste based on the following information:

- If the site performs electroplating operations, sludge from treatment of electroplating wastewater on site is listed as hazardous waste F006 (40 CFR 260.31).
- If the site mixes electroplating wastewaters or sludges with other wastewaters or sludges generated on site, the resulting mixture would be a hazardous waste under the RCRA "mixture rule." (40 CFR 261.3(a)(2)(iv)).
- If the sludge from wastewater treatment exceeds the standards for the Toxicity Characteristic Leaching Procedure (*i.e.* is hazardous), or exhibits other RCRA-defined hazardous characteristics (*i.e.,* reactive, corrosive, or flammable) it is considered a characteristic hazardous waste (40 CFR 261.24).

Additional federal, state, and local regulations may result in steel finishing sludges being classified as a hazardous waste.

Based on information collected during site visits and sampling episodes to Iron and Steel operations, the Agency believes that some of the solid waste generated by steel finishing operations would not be classified as hazardous. However, for the purpose of compliance cost estimation, the Agency assumed that all solid waste generated as a result of the technology options would be hazardous. Date provided in the industry surveys indicates the total annual sludge production from all steel finishing operations throughout the industry was approximately 21,000 tons/year (dry weight). Additional sludge generation from finishing operations resulting from this proposed rule is approximately 900 tons/year (dry weight).

C. Energy Requirements

EPA estimates that compliance with this proposed regulation would result in a net increase in energy consumption at Iron and Steel facilities. The maximum estimated increased energy use by subcategory are presented in Table VIII–1. The costs associated with these energy requirements are included in EPA's estimated operating costs for compliance with the proposed rule. The projected increase in energy consumption is primarily due to the incorporation of components such as pumps, mixers, blowers, and fans. the integrated and stand-alone hot forming mills, the added energy requirements are related to recycle systems. Electrical equipment in the recycle system includes sand filters, cooling towers, and recycle pumps to return the treated and cooled water to the process.

TABLE VIII–1.—ADDITIONAL ENERGY REQUIREMENTS BY SUBCATEGORY

Subcategory	Energy required (million kilowatt hours/year)
Cokemaking Operations	21.7
Ironmaking Operations	10.6
Integrated Steelmaking Operations	7.8
Integrated and Stand-Alone Hot ming Operations	170
Non-Integrated Steelmaking and Hot ming Operations	8.4
Steel Finishing Operations	2.0
Other Operations	0.04
Total	220.54

Approximately 3,100,000 million kilowatt hours of electric power were generated in the United States in 1997 (Energy Information Administration, Electric Power Annual 1998 Volume 1, Table A1). Total additional energy needs for all Iron and Steel facilities to comply with this proposed rule correspond to approximately 0.007% of the national energy demand. The increase in energy demand due to the implementation of this proposed rule will in turn cause an air emission impact from the electric power generation facilities. The increase in air emissions is expected to be proportional to the increase in energy requirements.

IX. Options Selected for Proposal

A. Introduction

1. Methodology for Proposed Selection of Regulated Pollutants

EPA selects pollutants for regulation based on the following factors: Applicable Clean Water Act provisions regarding the pollutants subject to each statutory level; the pollutants of concern identified for each subcategory; and co-treatment of compatible wastewaters from different manufacturing operations.

The current regulation requires facilities to maintain the pH between 6.0 and 9.0 at all times. EPA intends to retain this limitation and proposes to codify identical pH limitations for previously unregulated subcategories. EPA also proposes to codify a specific reference to the general exception codified at 40 CFR 401.17, which authorizes excursions from the pH range codified in the applicable effluent limitations guidelines under certain enumerated circumstances. The pH shall be monitored at the point of discharge from the wastewater treatment facility to which effluent limitations derived from this part apply.

EPA selected a subset of pollutants for which to establish numerical effluent limitations from the list of Pollutants of Concern (POC) for each regulated subcategory. Section IV.F discusses EPA's methodology for selecting Pollutants of Concern (POC) and identifies on a subcategory basis the POCs relevant to this proposal. Generally, a chemical is considered as a POC if it was detected in untreated process wastewater at 10 times the minimum level (ML) in more than 10% of the samples.

Monitoring for all pollutants of concern is not necessary to ensure that Iron and Steel wastewater pollution is adequately controlled, since many of the pollutants originate from similar sources, have similar treatabilities, are removed by similar mechanisms, and treated to similar levels. Therefore, it may be sufficient to monitor for one pollutant as a surrogate or indicator of several others.

Regulated pollutants are pollutants for which the EPA would establish numerical effluent limitations and standards. EPA selected a POC for regulation in a subcategory if it meets all the following criteria:

- With the exception of TRC, chemical is not used as a treatment chemical in the selected treatment technology option.
- Chemical is not considered a non-conventional bulk parameter.
- Chemical is not considered as a volatile compound, *e.g.,* generally with Henry's Constant greater than or equal to $1x10^{-4}$.
- Chemical is effectively treated by the selected treatment technology option.
- Chemical is detected in the untreated wastewater at treatable levels in a significant number of samples, *e.g.,* generally 10 times the minimum level at more than 10% of the raw wastewater samples.
- Chemicals whose control through treatment processes would lead to control of a wide range of pollutants with similar properties; these chemicals are generally good indicators of overall wastewater treatment performance.

Based on the methodology described above, EPA proposes to regulate pollutants in each subcategory that will ensure adequate control of a range of pollutants.

a. *Clean Water Act.* The CWA provides for the limitation of conventional, non-conventional and toxic pollutants at the following regulatory levels:

BPT: conventional, non-conventional, toxic
BAT: non-conventional, toxic
NSPS: conventional, non-conventional, toxic
PSES: pass through/interfere or otherwise incompatible with POTW
PSNS: pass through/interfere or otherwise incompatible with POTW
BCT: conventional

b. *Pollutants of Concern.* Depending on the manufacturing processes, the wastewater characteristics vary from operation to operation. The pollutants to be regulated are proposed on a subcategory basis.

c. *Co-Treatment of Compatible Wastewaters.* Wastewaters from certain manufacturing operations are compatible for treatment in a single treatment system. EPA's proposed selection of regulated parameters is designed to foster co-treatment of compatible wastewaters and to discourage co-treatment of wastewaters which the Agency believes to be incompatible.

Untreated by-product cokemaking process wastewaters contain relatively high concentrations of ammonia, cyanide, phenolic compounds, and several toxic organic compounds including benzene, toluene, xylene and polynuclear aromatic compounds. The chemical composition of those wastewaters is unique within the iron and steel industry, as are the physical/chemical and biological processes typically used to treat them. Consequently, EPA regards cokemaking wastewaters to be incompatible with wastewaters from other subcategories. Therefore, the model technologies EPA proposes and the corresponding limitations are designed to discourage co-treatment with wastewaters from operations in other subcategories.

Process wastewaters from the sintering and blast furnace operations segments of the proposed ironmaking subcategory contain many of the same pollutants (ammonia, cyanide, phenolic compounds, toxic metals and high loadings of suspended solids from wet air pollution control and gas cleaning operations). They are universally co-treated where sinter plants with wet air pollution controls are co-located with blast furnaces. Accordingly, the proposed regulation is structured to facilitate co-treatment and permitting of those wastewaters independent of wastewaters from other subcategories. Likewise, the regulation is structured to allow for co-treatment and cascading of wastewaters from the integrated steelmaking operations (basic oxygen furnaces, vacuum degassing, continuous casting). These wastewaters contain typically the same toxic metals.

Like the current regulation, the proposed regulation is based on the assumption that recycle system blowdowns from hot forming operations are compatible with wastewaters from steelmaking and steel finishing operations. When recycled to a high degree, the remaining volume of hot forming wastewaters can be effectively co-treated for TSS, O&G, lead and zinc with steelmaking and steel finishing wastewaters. Today's proposed regulation would limit the same toxic metals, such as lead and zinc, for carbon and alloy steel hot forming operations, carbon and alloy steelmaking, and steel finishing operations. This approach is intended to facilitate co-treatment and NPDES permitting across subcategories where feasible. EPA has taken the same approach with chromium and nickel for stainless steel hot forming, non-integrated steelmaking, and steel finishing operations. Notwithstanding EPA's consideration of this factor, EPA does not propose to exclude any pollutants from regulation on the theory that they are not amenable to co-treatment.

2. Pollutants Selected for Pretreatment Standards

Unlike direct dischargers whose wastewater will receive no further treatment once it leaves the facility, indirect dischargers send their wastewater to POTWs for further treatment. EPA establishes pretreatment standards for those BAT pollutants that pass through POTWs. Therefore, for indirect dischargers, before proposing pretreatment standards, EPA examines whether the pollutants discharged by the industry ''pass through'' POTWs to waters of the U.S. or interfere with POTW operations or sludge disposal practices. Generally, to determine if pollutants pass through POTWs, EPA compares the percentage of the pollutant removed by well-operated POTWs achieving secondary treatment with the percentage of the pollutant removed by facilities meeting BAT effluent limitations. A pollutant is determined to ''pass through'' POTWs when the median percentage removed by well-operated POTWs is less than the median percentage removed by direct dischargers complying with BAT effluent limitations. In this manner, EPA can ensure that the combined treatment at indirect discharging facilities and POTWs is at least equivalent to that obtained through treatment by direct dischargers.

This approach to the definition of pass-through satisfies two competing objectives set by Congress: (1) That standards for indirect dischargers be equivalent to standards for direct dischargers, and (2) that the treatment capability and performance of POTWs be recognized and taken into account in regulating the discharge of pollutants from indirect dischargers. Rather than compare the mass or concentration of pollutants discharged by POTWs with the mass or concentration of pollutants discharged by BAT facilities, EPA compares the percentage of the pollutants removed by BAT facilities to the POTW removals. EPA takes this approach because a comparison of the mass or concentration of pollutants in POTW effluents with pollutants in BAT facility effluents would not take into account the mass of pollutants discharged to the POTW from other industrial and non-industrial sources, nor the dilution of the pollutants in the POTW to lower concentrations from the addition of large amounts of other industrial and non-industrial water.

The primary source of the POTW percent removal data is the ''Fate of Priority Pollutants in Publicly Owned Treatment Works'' (EPA 440/1–82/303, September 1982), commonly referred to as the ''50-POTW Study.'' This study presents data on the performance of 50 well-operated POTWs that employ secondary biological treatment in removing pollutants. Each sample was analyzed for three conventional, 16 non-conventional, and 126 priority toxic pollutants.

At the time of the 50-POTW sampling program, which spanned approximately 2½ years (July 1978 to November 1980), EPA collected samples at selected POTWs across the U.S. The samples were subsequently analyzed by either EPA or EPA-contract laboratories using test procedures (analytical methods) specified by the Agency or in use at the laboratories. Laboratories typically reported the analytical method used along with the test results. However, for those cases in which the laboratory specified no analytical method, EPA was able to identify the method based on the nature of the results and knowledge of the methods available at the time.

Each laboratory reported results for the pollutants for which it tested. If the laboratory found a pollutant to be present, the laboratory reported a result. If the laboratory found the pollutant not to be present, the laboratory reported either that the pollutant was ''not detected'' or a value with a ''less than'' sign (<) indicating that the pollutant was below that value. The value reported along with the ''less than'' sign was the lowest level to which the laboratory believed it could reliably measure. EPA subsequently established these lower levels as the minimum levels of quantitation (MLs). In some instances, different laboratories reported different MLs for the same pollutant using the same analytical method.

Because of the variety of reporting protocols among the 50-POTW Study laboratories (pages 27 to 30, 50-POTW Study), EPA reviewed the percent removal calculations used in the pass-through analysis for previous industry studies, including those performed when developing effluent guidelines for Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) Manufacturing, Centralized Waste Treatment (CWT), and Commercial Hazardous Waste Combustors. EPA found that, for at least 12 parameters, different analytical minimum levels were reported for different rulemaking studies (10 of the 21 metals, cyanide, and one of the 41 organics).

To provide consistency for data analysis and establishment of removal efficiencies, EPA reviewed the 50-POTW Study, standardized the reported MLs for use in the final rules for CWT and Transportation Equipment Cleaning Industries and for this proposed rule and the Metal Products and Machinery proposed rule. A more detailed discussion of the methodology used and the results of the ML evaluation are contained in the record for today's proposal.

In using the 50-POTW Study data to estimate percent removals, EPA has established data editing criteria for determining pollutant percent removals. Some of the editing criteria are based on differences between POTW and industry BAT treatment system influent concentrations. many toxic pollutants, POTW influent concentrations were much lower than those of BAT treatment systems. many pollutants, particularly organic pollutants, the effluent concentrations from both POTW and BAT treatment systems were below the level that could be found or measured. As noted in the 50-POTW Study, analytical laboratories reported pollutant concentrations below the analytical threshold level, qualitatively, as ''not detected'' or ''trace,'' and reported a measured value above this level. Subsequent rulemaking studies such as the 1987 OCPSF study used the analytical method nominal ''minimum level'' (ML) established in 40 CFR Part 136 for laboratory data reported below the analytical threshold level. Use of the nominal minimum level (ML) may overestimate the effluent concentration and underestimate the percent removal. Because the data collected for evaluating POTW percent removals included both effluent and influent levels that were close to the analytical detection levels, EPA devised hierarchal data editing criteria to exclude data with low influent concentration levels, thereby minimizing the possibility that low POTW removals might simply reflect low influent concentrations instead of being a true measure of treatment effectiveness.

EPA has generally used hierarchic data editing criteria for the pollutants in the 50-POTW Study. today's proposal, EPA used the following editing criteria:

(1) Substitute the standardized pollutant-specific analytical minimum level for values reported as ''not detected,'' ''trace,'' ''less than [followed by a number],'' or a number less than the standardized analytical minimum level,

(2) Retain pollutant influent and corresponding effluent values if the average pollutant influent level is greater than or equal to 10 times the pollutant minimum level (10xML), and

(3) If none of the average pollutant influent concentrations are at least 10 times the minimum level, then retain average influent values greater than or equal to two times the minimum level (2xML) along with the corresponding average effluent values. (In most cases, 2xML will be equal to or less than 20 μg/l.)

EPA then calculates each POTW percent removal for each pollutant based on its average influent and its average effluent values. The national POTW percent removal used for each pollutant in the pass-through test is the median value of all the POTW pollutant specific percent removals.

The rationale for retaining POTW data using the ''10xML'' editing criterion is based on the BAT organic pollutant treatment performance editing criteria initially developed for the 1987 OCPSF regulation (52 FR 42522, 42545–48; November 5, 1987). BAT treatment system designs in the OCPSF industry typically achieved at least 90 percent removal of toxic pollutants. Since most of the OCPSF effluent data from BAT biological treatment systems had values of ''not detected,'' the average influent concentration for a compound had to be at least 10 times the analytical minimum level for the difference to be meaningful (demonstration of at least 90 percent removal) and qualify effluent concentrations for calculation of effluent limits.

Additionally, due to the large number of pollutants of concern for the Iron and Steel industry, EPA also used data from the National Risk Management Research Laboratory (NRMRL) Treatability Database (formerly called the Risk Reduction Engineering Laboratory (RREL) database) to augment the POTW database for the pollutants which the 50-POTW Study did not cover. This database provides information, by pollutant, on removals obtained by various treatment technologies. The database provides the user with the specific data source and the industry from which the wastewater was generated. each pollutant of concern EPA considered for this proposed rule that was not found in the 50-POTW database, EPA used data from the NRMRL database, using only treatment technologies representative of typical POTW secondary treatment operations (activated sludge, activated sludge with filtration, aerated lagoons). EPA further edited these files to include information pertaining only to domestic or industrial wastewater. EPA used pilot-scale and full-scale data only, and eliminated bench-scale data and data from less reliable references. These and other aspects of the methodology used for this proposal are described in Chapter 11 of the Technical Development Document.

The results of the POTW pass-through analysis for indirect dischargers are discussed in Sections IX.B-H for each subcategory.

3. Issues Related to the Methodology Used to Determine POTW Performance

today's proposal, EPA used its traditional methodology to determine POTW performance (percent removal) for toxic and non-conventional pollutants. POTW performance is a component of the pass-through methodology used to identify the pollutants to be regulated for PSES and PSNS. It is also a component of the analysis to determine net pollutant reductions (for both total pounds and toxic pound-equivalents) for various indirect discharge technology options. However, as discussed in more detail below, EPA is considering revisions to its traditional methodology for determining POTW performance and solicits comments on a variety of methodological changes.

a. *Assessment of Acceptable POTWs.* EPA developed the principle pass-through analysis for today's iron and steel proposal by using data from all 50 POTWs that were part of the 50 POTW Study data base. Some of these POTWs were not operated to meet the secondary treatment requirements at 40 CFR part 133 for all portions of their wastestream. Most POTWs today have secondary treatment or better in place. EPA estimates that as of 1996, POTWs with at least secondary treatment in place service greater than 90 percent of the indirect discharging population. If the POTW removal calculations do not reflect the upgrades and system improvements that have occurred since the time of the 50 POTW Study, they would tend to under-estimate POTW removals. This would result in overestimating the pollutant reductions that are achieved through the regulation of indirect dischargers, thereby making the regulation appear more cost-effective for indirect dischargers than it is.

One partial solution to this methodological issue would be to evaluate individual treatment trains in the 50 POTW Study data base, and include only those treatment trains that achieved compliance with 40 CFR part 133 in the analysis of POTW pollutant removal rates. There were 29 treatment trains that achieved BOD_5 and TSS effluent concentrations between 15 mg/